R&S®TSME
Ultra Compact Drive Test Scanner
User Manual

1514.6542.02 ─ 05

Test & Measurement

User Manual

ROHDE&SCHWARZ

This manual describes the following R&S®TSME models and options:

- R&S®TSME (1514.6520K02)
- TD-SCDMA Option R&S®TSME-K20 (1510.0079.02)
- WCDMA Scanner Option R&S®TSME-K21 (1514.6820.02)
- CDMA2000® Option R&S®TSME-K22 (1514.6836.02)
- GSM Scanner Option R&S®TSME-K23 (1510.0085.02)
- 1xEVDO Option R&S®TSME-K24 (1510.0010.02)
- TETRA Scanner Option R&S®TSME-K26 (1514.6920.02)
- RF Power Scan Option R&S®TSME-K27 (1514.6813.02)
- WiMAX Scanner Option R&S®TSME-K28 (1514.6842.02)
- LTE Scanner Option R&S®TSME-K29 (1514.6859.02)
- LTE MIMO 2x2, 4x2 R&S®TSME-K30 (1514.6871.02)
- LTE DL Allocation Analyzer Scanner R&S®TSME-K31 (1522.6990.02)
- Automatic Channel Detection R&S®TSME-K40 (1514.7232.02)

© 2015 Rohde & Schwarz GmbH & Co. KG
Mühldorfstr. 15, 81671 München, Germany
Phone: +49 89 41 29 - 0
Fax: +49 89 41 29 12 164
E-mail: info@rohde-schwarz.com
Internet: www.rohde-schwarz.com
Subject to change – Data without tolerance limits is not binding.
R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.
CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA -USA).
WiMAX Forum® is a registered trademark of the WiMAX Forum. WiMAX™, the WiMAX Forum logo, WiMAX Forum Certified™ and the WiMAX Forum Certified logo are trademarks of the WiMAX Forum.
Trade names are trademarks of the owners.

The following abbreviations are used throughout this manual: R&S®TSME is abbreviated as R&S TSME.

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for any purpose other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

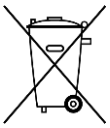
The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and, in some cases, a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories. For product-specific information, see the data sheet and the product documentation.

Safety labels on products

The following safety labels are used on products to warn against risks and dangers.

Symbol	Meaning	Symbol	Meaning
	Notice, general danger location Observe product documentation		ON/OFF Power
	Caution when handling heavy equipment		Standby indication
	Danger of electric shock		Direct current (DC)

Symbol	Meaning	Symbol	Meaning
	Caution ! Hot surface		Alternating current (AC)
	Protective conductor terminal To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth		Direct/alternating current (DC/AC)
	Earth (Ground)		Class II Equipment to identify equipment meeting the safety requirements specified for Class II equipment (device protected by double or reinforced insulation)
	Frame or chassis Ground terminal		EU labeling for batteries and accumulators For additional information, see section "Waste disposal/Environmental protection", item 1.
	Be careful when handling electrostatic sensitive devices		EU labeling for separate collection of electrical and electronic devices For additional information, see section "Waste disposal/Environmental protection", item 2.
	Warning! Laser radiation For additional information, see section "Operation", item 7.		

Signal words and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.

DANGER Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Indicates information considered important, but not hazard-related, e.g. messages relating to property damage.
In the product documentation, the word ATTENTION is used synonymously.

These signal words are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the signal words described here are always used only in connection with the related product documentation and the related product. The use of signal words in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: predefined operating position is always with the housing floor facing down, IP protection 2X, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of ±10 % shall apply to the nominal voltage and ±5 % to the nominal frequency, overvoltage category 2, pollution degree 2.
2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or even death.
3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or even death.

Electrical safety

If the information on electrical safety is not observed either at all or to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the mains-supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with a protective conductor contact and protective conductor.
3. Intentionally breaking the protective conductor either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
4. If there is no power switch for disconnecting the product from the mains, or if the power switch is not suitable for this purpose, use the plug of the connecting cable to disconnect the product from the mains. In such cases, always ensure that the power plug is easily reachable and accessible at all times. For example, if the power plug is the disconnecting device, the length of the connecting cable must not exceed 3 m. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, the disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cables on a regular basis to ensure that they are in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

6. The product may be operated only from TN/TT supply networks fuse-protected with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket provided for this purpose. Otherwise, sparks that result in fire and/or injuries may occur.
8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
9. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fuse protection, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC 60950-1 / EN 60950-1 or IEC 61010-1 / EN 61010-1 standards that apply in each case.
11. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
12. If a product is to be permanently installed, the connection between the protective conductor terminal on site and the product's protective conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.
13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fuse-protected in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.
14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.
16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1). Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

1. Operating the products requires special training and intense concentration. Make sure that persons who use the products are physically, mentally and emotionally fit enough to do so; otherwise, injuries or material damage may occur. It is the responsibility of the employer/operator to select suitable personnel for operating the products.

2. Before you move or transport the product, read and observe the section titled "Transport".
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.
4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal/Environmental protection", item 1.
5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.
6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.
7. Laser products are given warning labels that are standardized according to their laser class. Lasers can cause biological harm due to the properties of their radiation and due to their extremely concentrated electromagnetic power. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).
8. EMC classes (in line with EN 55011/CISPR 11, and analogously with EN 55022/CISPR 22, EN 55032/CISPR 32)
   - Class A equipment:
     Equipment suitable for use in all environments except residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings
     Note: Class A equipment is intended for use in an industrial environment. This equipment may cause radio disturbances in residential environments, due to possible conducted as well as radiated disturbances. In this case, the operator may be required to take appropriate measures to eliminate these disturbances.
   - Class B equipment:
     Equipment suitable for use in residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, protective conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.
2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.
3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.
4. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
5. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.
6. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.
7. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.
2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.
3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Waste disposal/Environmental protection

1. Specially marked equipment has a battery or accumulator that must not be disposed of with unsorted municipal waste, but must be collected separately. It may only be disposed of at a suitable collection point or via a Rohde & Schwarz customer service center.
2. Waste electrical and electronic equipment must not be disposed of with unsorted municipal waste, but must be collected separately.
   Rohde & Schwarz GmbH & Co. KG has developed a disposal concept and takes full responsibility for take-back obligations and disposal obligations for manufacturers within the EU. Contact your Rohde & Schwarz customer service center for environmentally responsible disposal of the product.
3. If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
4. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

For additional information about environmental protection, visit the Rohde & Schwarz website.

Instrucciones de seguridad elementales

¡Es imprescindible leer y cumplir las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad de la UE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

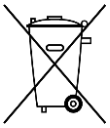
Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o sin tener en cuenta las instrucciones del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del mal uso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios. Los datos específicos del producto figuran en la hoja de datos y en la documentación del producto.

Señalización de seguridad de los productos

Las siguientes señales de seguridad se utilizan en los productos para advertir sobre riesgos y peligros.

Símbolo	Significado	Símbolo	Significado
	Aviso: punto de peligro general Observar la documentación del producto		Tensión de alimentación de PUESTA EN MARCHA / PARADA
	Atención en el manejo de dispositivos de peso elevado		Indicación de estado de espera (standby)
	Peligro de choque eléctrico		Corriente continua (DC)
	Advertencia: superficie caliente		Corriente alterna (AC)
	Conexión a conductor de protección		Corriente continua / Corriente alterna (DC/AC)
	Conexión a tierra		El aparato está protegido en su totalidad por un aislamiento doble (reforzado)
	Conexión a masa		Distintivo de la UE para baterías y acumuladores Más información en la sección "Eliminación/protección del medio ambiente", punto 1.

Símbolo	Significado	Símbolo	Significado
	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)		Distintivo de la UE para la eliminación por separado de dispositivos eléctricos y electrónicos Más información en la sección "Eliminación/protección del medio ambiente", punto 2.
	Advertencia: rayo láser Más información en la sección "Funcionamiento", punto 7.		

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.

Indica una situación de peligro que, si no se evita, causa lesiones graves o incluso la muerte.

Indica una situación de peligro que, si no se evita, puede causar lesiones graves o incluso la muerte.

Indica una situación de peligro que, si no se evita, puede causar lesiones leves o moderadas.

Indica información que se considera importante, pero no en relación con situaciones de peligro; p. ej., avisos sobre posibles daños materiales.
En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación del producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de ±10 % sobre el voltaje nominal y de ±5 % sobre la frecuencia nominal. Categoría de sobrecarga eléctrica 2, índice de suciedad 2.
2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, se pueden causar lesiones o, en determinadas circunstancias, incluso la muerte.
3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.
2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.
3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.
4. Si el producto no está equipado con un interruptor para desconectarlo de la red, o bien si el interruptor existente no resulta apropiado para la desconexión de la red, el enchufe del cable de conexión se deberá considerar como un dispositivo de desconexión.
   El dispositivo de desconexión se debe poder alcanzar fácilmente y debe estar siempre bien accesible. Si, p. ej., el enchufe de conexión a la red es el dispositivo de desconexión, la longitud del cable de conexión no debe superar 3 m).
   Los interruptores selectores o electrónicos no son aptos para el corte de la red eléctrica. Si se integran productos sin interruptor en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.
5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.

6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).
7. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.
8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.
9. En las mediciones en circuitos de corriente con una tensión U_{eff} > 30 V se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.
11. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar lesiones, fuego o daños en el producto.
12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.
14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.
15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.
16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.
17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.
18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.
2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".
3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados —los llamados alérgenos (p. ej. el níquel)—. Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.
4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación/protección del medio ambiente", punto 1.
5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalizar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.
6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.
7. Los productos con láser están provistos de indicaciones de advertencia normalizadas en función de la clase de láser del que se trate. Los rayos láser pueden provocar daños de tipo biológico a causa de las propiedades de su radiación y debido a su concentración extrema de potencia electromagnética. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).
8. Clases de compatibilidad electromagnética (conforme a EN 55011 / CISPR 11; y en analogía con EN 55022 / CISPR 22, EN 55032 / CISPR 32)
   - Aparato de clase A:
     Aparato adecuado para su uso en todos los entornos excepto en los residenciales y en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.
     Nota: Los aparatos de clase A están destinados al uso en entornos industriales. Estos aparatos pueden causar perturbaciones radioeléctricas en entornos residenciales debido a posibles perturbaciones guiadas o radiadas. En este caso, se le podrá solicitar al operador que tome las medidas adecuadas para eliminar estas perturbaciones.
   - Aparato de clase B:
     Aparato adecuado para su uso en entornos residenciales, así como en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.
2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.
2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.
3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.
4. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.
5. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.
6. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).
7. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.

2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.
3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación/protección del medio ambiente

1. Los dispositivos marcados contienen una batería o un acumulador que no se debe desechar con los residuos domésticos sin clasificar, sino que debe ser recogido por separado. La eliminación se debe efectuar exclusivamente a través de un punto de recogida apropiado o del servicio de atención al cliente de Rohde & Schwarz.
2. Los dispositivos eléctricos usados no se deben desechar con los residuos domésticos sin clasificar, sino que deben ser recogidos por separado.
   Rohde & Schwarz GmbH & Co.KG ha elaborado un concepto de eliminación de residuos y asume plenamente los deberes de recogida y eliminación para los fabricantes dentro de la UE. Para desechar el producto de manera respetuosa con el medio ambiente, diríjase a su servicio de atención al cliente de Rohde & Schwarz.
3. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polvos con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.
4. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

Se puede encontrar más información sobre la protección del medio ambiente en la página web de Rohde & Schwarz.

Quality management and environmental management

Certified Quality System
ISO 9001

Certified Environmental System
ISO 14001

Sehr geehrter Kunde,
Sie haben sich für den Kauf eines Rohde&Schwarz Produktes entschieden. Sie erhalten damit ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unserer Qualitäts- und Umweltmanagementsysteme entwickelt, gefertigt und geprüft. Rohde&Schwarz ist unter anderem nach den Managementsystemen ISO 9001 und ISO 14001 zertifiziert.

Der Umwelt verpflichtet
- Energie-effiziente, RoHS-konforme Produkte
- Kontinuierliche Weiterentwicklung nachhaltiger Umweltkonzepte
- ISO 14001-zertifiziertes Umweltmanagementsystem

Dear customer,
You have decided to buy a Rohde&Schwarz product. This product has been manufactured using the most advanced methods. It was developed, manufactured and tested in compliance with our quality management and environmental management systems. Rohde&Schwarz has been certified, for example, according to the ISO 9001 and ISO 14001 management systems.

Environmental commitment
- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Cher client,
Vous avez choisi d'acheter un produit Rohde&Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests de ce produit ont été effectués selon nos systèmes de management de qualité et de management environnemental. La société Rohde&Schwarz a été homologuée, entre autres, conformément aux systèmes de management ISO 9001 et ISO 14001.

Engagement écologique
- Produits à efficience énergétique
- Amélioration continue de la durabilité environnementale
- Système de management environnemental certifié selon ISO 14001

ROHDE&SCHWARZ
1171.0200.11 V 05.01
1171020011

Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

Europe, Africa, Middle East

Phone +49 89 4129 12345
customersupport@rohde-schwarz.com

North America

Phone 1-888-TEST-RSA (1-888-837-8772)
customer.support@rsa.rohde-schwarz.com

Latin America

Phone +1-410-910-7988
customersupport.la@rohde-schwarz.com

Asia/Pacific

Phone +65 65 13 04 88
customersupport.asia@rohde-schwarz.com

China

Phone +86-800-810-8228 /
+86-400-650-5896
customersupport.china@rohde-schwarz.com

ROHDE&SCHWARZ

1171.0200.22-06.00

Contents

1 Introduction 5
1.1 Feature Overview 5
1.2 Measurement Setup 5
1.3 The R&S TSME Option Concept 8
2 Preparing for Use 13
2.1 Unpacking and Setting Up the Instrument 14
2.2 Connecting the R&S TSME 15
2.3 Switching the Instrument On and Off 24
2.4 Connecting the R&S TSME to a Software Application for the First Time 25
2.5 Checking the Instrument 26
3 Front and Rear Panel Description 27
3.1 Front Panel 27
3.2 Rear Panel 27
4 Basic R&S TSME Functions 31
4.1 The R&S TSME Device Manager 31
4.2 Obtaining Device Information 33
4.3 Changing the IP Address for Multiple R&S TSME Configuration 34
4.4 Installing and Managing Software License Keys 35
4.5 Obtaining Firmware and Correction Data Updates 37
4.6 Configuring Measurement Bands 39
4.7 Interacting with R&S ROMES and R&S ViCom 41
5 Maintenance 43
6 Troubleshooting 44
6.1 Overview of Instrument Modes 44
6.2 Guide to Solving Instrument Connection Problems 46
6.3 Solving Other Miscellaneous Problems 49
A Appendix: Available Cellular Bands 51
Index 58

1 Introduction

1.1 Feature Overview

The R&S TSME ultra compact drive test scanner is a high-power platform for optimizing all conventional mobile radio networks. A highly sensitive 20 MHz front end for any input frequencies from 350 MHz to 4400 MHz, and an FPGA-based software-defined architecture offer unsurpassed performance while providing maximum flexibility and future-proofness.

- User-definable input frequency range from 350 MHz to 4400 MHz
- An RF and signal processing path with a bandwidth of 20 MHz
- Support of TD-SCDMA measurements (R&S TSME-K20)
- Support of WCDMA measurements (R&S TSME-K21)
- Support of CDMA2000® measurements (R&S TSME-K22)
- Support of GSM measurements (R&S TSME-K23)
- Support of 1xEV-DO measurements (R&S TSME-K24)
- Support of TETRA measurements (R&S TSME-K26)
- Support of RF Power Scan (R&S TSME-K27)
- Support of WiMAX™ IEEE802.16e measurements (R&S TSME-K28)
- Support of 3GPP LTE FDD & TD-LTE measurements (R&S TSME-K29)
- Support of 3GPP LTE MIMO measurements (R&S TSME-K30)
- Support of 3GPP LTE DL allocation analysis (R&S TSME-K31)
- Support of automatic channel detection (ViCom only, not for R&S®ROMES4) (R&S TSME-K40)
- Support of position estimation of base stations together with R&S ROMES software (R&S ROMES option ROMES4LOC)
- Parallel measurements in GSM, WCDMA, TD-SCDMA, CDMA2000® 1xEV-DO, WiMAX™, LTE and TETRA networks
- ViCom programming interface for customer specific applications
- Future-proof software-defined architecture
- Embedded high sensitivity GPS receiver

1.2 Measurement Setup

The R&S TSME is not a stand-alone drive test scanner; it requires a *host PC* connected via LAN and some additional equipment in order to perform measurements.

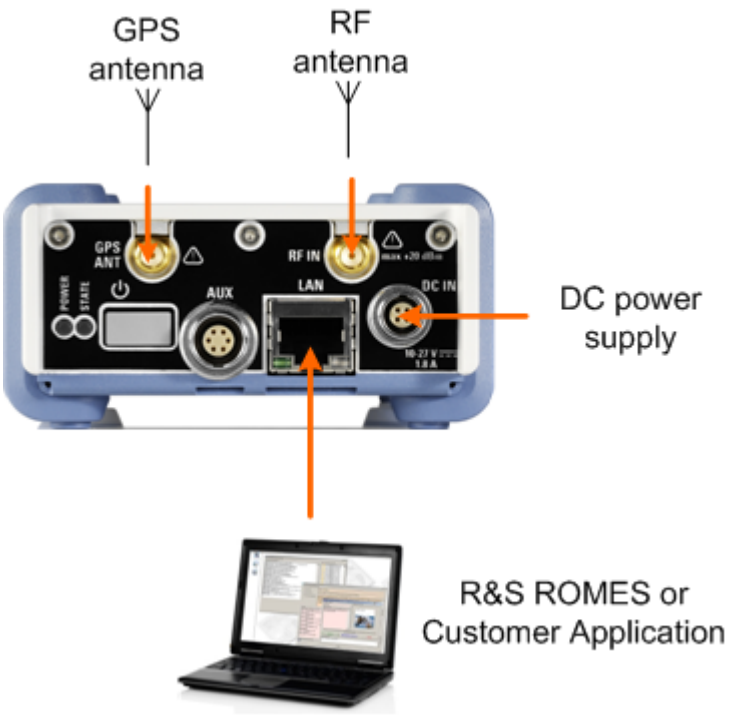


Fig. 1-1: Typical Measurement Setup with the R&S TSME

Important requirements for host PC

In order to control and perform measurements with the R&S TSME, a host PC or notebook with LAN interface is required (not included in the package), with the following **minimum configuration**:

- Intel Quad-Core i7
- 4 GB Memory
- Windows 7
- **Dedicated Gbit LAN adaptor** with **Jumbo Frames (>9 kB)** and **Flow Control** enabled

It is important for the host PC to have its own **dedicated LAN adaptor** for the connection to one or more R&S TSMEs only, and is not integrated in a regular office network. The host PC must have a **fixed IP address** with which it connects to the R&S TSME.

There are different possibilities for the host PC to control the R&S TSME:

- Using the drive test software platform R&S ROMES (not part of this package!)
- Using the R&S ViCom programming interface package and integrating the R&S TSME as an OEM product into a customer specific software application

The host PC is required for the following tasks:

- Obtaining hardware and firmware information on the R&S TSME (via the R&S TSME Device Manager, see chapter 4.2, "Obtaining Device Information", on page 33)

- Configuring the R&S TSME (via the R&S TSME Device Manager, see chapter 4.1, "The R&S TSME Device Manager", on page 31)
- Sending the measurement commands (via the drive test software), thus controlling and performing the actual measurement
- Updating the R&S TSME firmware when required (see "Automatic firmware updates" on page 41)

In addition to the host PC, the following further equipment is required to perform measurements with the R&S TSME:

For an overview of the package contents for the R&S TSME refer to "Accessory list" on page 14 and to the Release Notes.

Table 1-1: Equipment required to perform measurements with the R&S TSME

Equipment	Availability
Antennas	• GPS: active antenna with cable and SMA connector included in package • RF antenna and cable (not included) • optionally: R&S TSME accessory antennas – TSME-ZA1 (1506.9817.02): Antenna-mount magnetic – TSME-ZA2 (1506.9823.02): Antenna-mount fixed – TSME-ZA3 (1506.9830.02): Antenna-mount magnetic with GPS – TSME-ZA4 (1506.9846.02): Antenna-mount fixed with GPS – TSMW-ZE8 (1506.9852.02): Antenna Emitter 698 MHz - 2700 MHz
Connection cables	• DC power supply cable with a cigarette lighter connector (included in package) • LAN cable to connect host PC (RJ45 Patch cable CAT6 2m, included in package) • Synchronization cable to synchronize multiple R&S TSMEs – (option R&S TSME-ZC2 - Synchronization cable for 2 R&S TSMEs, order no. 1522.6560.02)
AC power supply	Optionally included in package: R&S TSME-Z1 (order number 1514.7310.00)
Required software options	Installed at the factory Additional software options can be installed subsequently via the R&S TSME Device Manager (for details refer to chapter 4.6, "Configuring Measurement Bands", on page 39).
World wide adaptor for earthing type plug	Included in R&S TSME-Z1 option, required to use the R&S TSME-Z1 world wide
R&S ROMES measurement software with appropriate technology option(s)	Not included in package
or: R&S ViCom Interface package for customer software	Included in package

1.3 The R&S TSME Option Concept

The R&S TSME scanner consists of the R&S TSME hardware as well as a set of (specified) technology and band options when it comes from the factory.

1.3.1 Technology Options

Technology options allow for the R&S TSME to scan the input based on a specific technology, for example, LTE. All technology options can be installed on the same instrument; the R&S TSME can measure various technologies simultaneously.

Following technology options are available (for current availablities see http://www2.rohde-schwarz.com/product/TSME.html):

Table 1-2: Available R&S TSME technology options

Options	Order number	Description
R&S TSME-K20	1510.0079.02	R&S TSME scanner option: TD-SCDMA
R&S TSME-K21	1514.6820.02	R&S TSME scanner option: WCDMA
R&S TSME-K22	1514.6836.02	R&S TSME scanner option: CDMA2000
R&S TSME-K23	1510.0085.02	R&S TSME scanner option: GSM
R&S TSME-K24	1510.0010.02	R&S TSME scanner option: EVDO
R&S TSME-K26	1514.6920.02	R&S TSME scanner option: TETRA
R&S TSME-K27	1514.6813.02	R&S TSME scanner option: RF-Power SCAN
R&S TSME-K28	1514.6842.02	R&S TSME scanner option: WiMAX
R&S TSME-K29	1514.6859.02	R&S TSME scanner option: LTE
R&S TSME-K30	1514.6871.02	R&S TSME scanner option: LTE MIMO
R&S TSME-K31	1522.6990.02	R&S TSME scanner option: LTE DL allocation analysis

Ordering software options

When you order a software option you must supply the serial number of the R&S TSME. License keys are shipped as a printed "License Keys List". Advance deliveries may consist of a PDF file. Unregistered software licenses can be downloaded from the Rohde & Schwarz website (https://extranet.rohde-schwarz.com/service).

For details see the "R&S TSME-Kx Software Options Installation Manual".

- TD-SCDMA Option (R&S TSME-K20)..... 9
- WCDMA Option (R&S TSME-K21)..... 9
- CDMA2000 Option (R&S TSME-K22)..... 9
- GSM Option (R&S TSME-K23)..... 9
- 1xEV-DO Option (R&S TSME-K24)..... 9
- TETRA Option (R&S TSME-K26)..... 9
- RF Power Scan Option (R&S TSME-K27)..... 10

- WiMAX Option (R&S TSME-K28)..... 10
- LTE Option (R&S TSME-K29) 10
- LTE MIMO Option (R&S TSME-K30).....10
- LTE Downlink Allocation Analyzer Option (R&S TSME-K31)..... 11

1.3.1.1 TD-SCDMA Option (R&S TSME-K20)

The R&S TSME-K20 option allows for the instrument to be used as a TD-SCDMA scanner. Hence the instrument can measure and identify all TD-SCDMA downlink (BTS) signals in the air.

1.3.1.2 WCDMA Option (R&S TSME-K21)

The R&S TSME-K21 option allows for the instrument to be used as a WCDMA scanner. With this option the instrument can measure and identify all WCDMA downlink (Node B and BTS) signals in the air. The main purpose of these measurements is to test the receiving conditions of a mobile device in a WCMDA network and to analyze possible interferences. During the subsequent spectrum analysis, a frequency sweep over a specified range is performed to detect arbitrary WCDMA downlink and uplink signals. Results of the WCDMA scans can be displayed in R&S ROMES within the corresponding PNS views.

1.3.1.3 CDMA2000 Option (R&S TSME-K22)

The R&S TSME-K22 option allows for the instrument to be used as a CDMA2000 scanner. Hence the instrument can measure and identify all CDMA2000 downlink (BTS) signals in the air.

1.3.1.4 GSM Option (R&S TSME-K23)

The R&S TSME-K23 option allows for the instrument to be used as a GSM scanner. With this option the instrument can measure and identify all GSM downlink (Node B and BTS) signals in the air. The main purpose of these measurements is to test the receiving conditions of a mobile device in a GSM network and to analyze possible interferences.

1.3.1.5 1xEV-DO Option (R&S TSME-K24)

The R&S TSME-K24 option allows for the instrument to be used as a 1xEV-DO scanner. Hence the instrument can measure and identify all 1xEV-DO downlink (BTS) signals in the air.

1.3.1.6 TETRA Option (R&S TSME-K26)

The R&S TSME-K26 option allows for the instrument to be used as a TETRA scanner. With this option the instrument can measure and identify all TETRA downlink (BTS)

signals in the air, also using direct-mode operation (DMO). The main purpose of this measurement is to test the receiving conditions of a mobile device in a TETRA network and to analyze possible interferences and find possible gaps in the coverage.

1.3.1.7 RF Power Scan Option (R&S TSME-K27)

The R&S TSME-K27 option allows for the instrument to be used as a power scanner. With this option the instrument can measure throughout the entire frequency range from 350 MHz to 4400 MHz. As a result, mobile radio bands as well as the uplink ranges can be measured, and detecting interference on the uplink frequencies becomes very easy. Results of the RF Power scans can be displayed in R&S ROMES within the corresponding RF Power Scanner Spectrum view.

1.3.1.8 WiMAX Option (R&S TSME-K28)

The R&S TSME-K28 option allows for the instrument to be used as a WiMAX scanner. With this option the instrument detects each and every available WiMAX signal with sensitivity below the noise level. Therefore it can check neighborhood information, and also identify interference signals from remote base stations. Together with R&S ROMES, for example, this option allows you to detect and visualize basic parameters such as FFT size, length of cyclic prefix and frame rate, preamble ID and the cell ID, as well as the segments used in the WiMAX signal. At the same time, it calculates the RSSI and the CINR based on the preamble. It provides an overview of the current situation on the air interface. Incorrect configurations in the network such as preamble IDs used more than once on the same center frequency in neighboring cells, different cycle prefix lengths or unexpectedly poor CINR values despite high RSSIs can thus be detected immediately.

1.3.1.9 LTE Option (R&S TSME-K29)

The R&S TSME-K29 option allows for the instrument to be used as an LTE scanner. TDD and FDD technologies are supported. Furthermore:

- Automatic detection and measurement of P-SCH and S-SCH channels
- Easy detection of interference
- Cyclic prefix analysis with a channel impulse response measurement

The option is useful, for example, to roll out and optimize 3GPP EUTRA networks.

1.3.1.10 LTE MIMO Option (R&S TSME-K30)

The R&S TSME-K30 option requires two R&S TSMEs, and allows measurement of MIMO parameters such as H-matrix, rank, condition number, estimated throughput and estimated CQI. This option is useful for the optimization of LTE MIMO networks.

1.3.1.11 LTE Downlink Allocation Analyzer Option (R&S TSME-K31)

The R&S TSME-K31 option allows for the instrument to measure the allocations for the different user epuipment (UE) of an eNodeB. This allows you to evaluate the average user throughput, average cell throughput, the cell load in terms of RB utilization and the everage number of users in the cell. The feature is useful for optimization and benchmarking of LTE networks.

1.3.2 Band Options

The band options have been introduced as a new concept to provide a more cost efficient scanner configuration when only a limited number of bands need to be measured. Using these options, the measurement bandwidth of the R&S TSME is limited to a number of cellular network bands (uplink and downlink). The bands can be freely selected by the user. Band options are independent from the technology options: a licensed technology can be measured in all licensed bands (uplink and downlink).

Alternatively, a R&S TSME band option is provided which can measure the full bandwidth. With this option the scanner can measure in the complete bandwidth from 350 MHz to 4.4 GHz without limitations. All installed technologies can be measured in this bandwidth at the same time.

Example:

For example, an R&S TSME with the technology options R&S TSME-K21 (WCDMA) and R&S TSME-K23 (GSM), as well as the band option R&S TSME-K2B (2 bands measured simultaneously), can scan for GSM and WCDMA signals in two bands (e.g. 900 MHz and 1800 MHz) at the same time.

Upgrade options are available to increase the bandwidth of the R&S TSME from a limited number of bands to full bandwidth.

Following band options are available:

Table 1-3: Available R&S TSME band options

Options	Order number	Description
R&S TSME-Kab	1514.7384.02	All bands measured simultaneously
R&S TSME-K1B	1514.7403.02	1 band measured simultaneously
R&S TSME-K2B	1514.7410.02	2 bands measured simultaneously
R&S TSME-K3B	1514.7426.02	3 bands measured simultaneously
R&S TSME-K4B	1514.7432.02	4 bands measured simultaneously
R&S TSME-K5B	1514.7449.02	5 bands measured simultaneously
R&S TSME-KUB	1514.7390.02	Upgrade: 1 additional band measured simultaneously

The R&S TSME band assignment can be reconfigured by the user (see chapter 4.6, "Configuring Measurement Bands", on page 39).

For an overview of available cellular bands and their characteristics see chapter A, "Appendix: Available Cellular Bands", on page 51.

2 Preparing for Use

⚠ WARNING

Risk of injury and instrument damage

The instrument must be used in an appropriate manner to prevent electric shock, fire, personal injury, or damage.

- Do not use an isolating transformer to connect the instrument to the AC power supply.
- Do not open the instrument casing.
- Read and observe the "Basic Safety Instructions" at the beginning of this manual or on the documentation CD-ROM, in addition to the safety instructions in the following sections. Notice that the data sheet may specify additional operating conditions.

NOTICE

Risk of instrument damage during operation

An unsuitable operating site or test setup can cause damage to the instrument and to connected devices. Ensure the following operating conditions before you switch on the instrument:

- The instrument is dry and shows no sign of condensation.
- The instrument is positioned as described in the following sections.
- Signal levels at the input connectors are all within the specified ranges.

NOTICE

Risk of electrostatic discharge (ESD)

Electrostatic discharge (ESD) can cause damage to the electronic components of the instrument and the device under test (DUT). ESD is most likely to occur when you connect or disconnect a DUT or test fixture to the instrument's test ports. To prevent ESD, use a wrist strap and cord and connect yourself to the ground, or use a conductive floor mat and heel strap combination.

For details, refer to the safety instructions delivered in electronic format on the documentation CD-ROM.

EMI suppression

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated electromagnetic interference (EMI):

- Use suitable shielded cables of high quality. For example, use double-shielded RF and LAN cables.
- Always terminate open cable ends.
- Note the EMC classification in the data sheet.
- Use the supplied DC cable or a DC cable shorter than 3 m.
- Do not operate the instrument in DC mains.
- Operate the instrument only with an **active** antenna connected to the GPS ANT connector.

2.1 Unpacking and Setting Up the Instrument

The following section describes how to set up the instrument.

NOTICE

Risk of instrument damage

Note that the general safety instructions also contain information on operating conditions that will prevent damage to the instrument. The instrument's data sheet may contain additional operating conditions.

Check the equipment for completeness using the delivery note and the accessory lists for the various items. Check the instrument for any damage. If there is damage, immediately contact the carrier who delivered the instrument. Make sure not to discard the box and packing material.

Packing material

Retain the original packing material. If the instrument needs to be transported or shipped at a later date, you can use the material to protect the control elements and connectors.

Accessory list

The following items are included with shipment of the R&S TSME:

- DC power supply cable with a cigarette lighter connector
- LAN cable to connect host PC (RJ45 Patch cable CAT6 2m)
- Active GPS antenna
- CD-ROM with required R&S TSME software, drivers, tools, and manual
- R&S TSME User Manual

Rackmounting

The R&S TSME can be installed in a 19 inch rack using a rack adaptor kit for 1 or 2 R&S TSMEs (R&S TSME-Z2, 1522.6502.02). The installation instructions are part of the adaptor kit.

Alternatively, the R&S TSME can be packed in a backback system (R&S TSME-Z3, order no. 1514.6936.02, see the corresponding "Getting Started" manual).

NOTICE

Risk of instrument damage due to overheating

An insufficient airflow can cause the instrument to overheat, which may disturb the operation and even cause damage.

Make sure that all fan openings are unobstructed and that the airflow perforations are unimpeded, particularly when the instrument is installed in a rack or packed in a backpack. The R&S TSME draws in fresh air from the bottom and warm air flows out at its sides.

Thus, if no active cooling is installed, ensure the following surrounding spaces to the instrument are kept clear:

- Bottom side: minimum 1 cm
- Left/right sides: minimum 2 cm

In very warm environments, do not stack instruments - place them side by side so that each instrument can draw sufficiently cool air.

2.2 Connecting the R&S TSME

This section describes how to connect the R&S TSME to the other devices in the measurement setup (see also chapter 1.2, "Measurement Setup", on page 5).

- Connecting the DC Power Supply....15
- Setting Up the LAN Connection to the Host PC....17
- Connecting External Devices....23
- Connecting a Kensington Lock....24

2.2.1 Connecting the DC Power Supply

The DC power supply connector is on the rear panel of the unit. Voltages from 10 V to 27 V are supported. There is no need to set the used voltage manually.

Possible power cable connections

The R&S TSME can work with the following DC power supplies:

- Cigarette lighter power supply (for example in a vehicle) using the supplied DC power cable

- Optional AC power supply and power cable R&S TSME-Z1 (see table 1-1)
- Proprietary power supply with an adapted power cable

Using the supplied cigarette lighter power supply cable

► To use the power supply from a cigarette lighter, connect the supplied power cable from the R&S TSME to the cigarette lighter.

Connecting a proprietary power supply

► In order to use a proprietary DC supply with the R&S TSME power cable, demount the cigarette lighter adaptor from the supplied power cable and connect the open ends of the cable to the proprietary power supply. Be sure to respect the correct polarity (see figure 2-1).

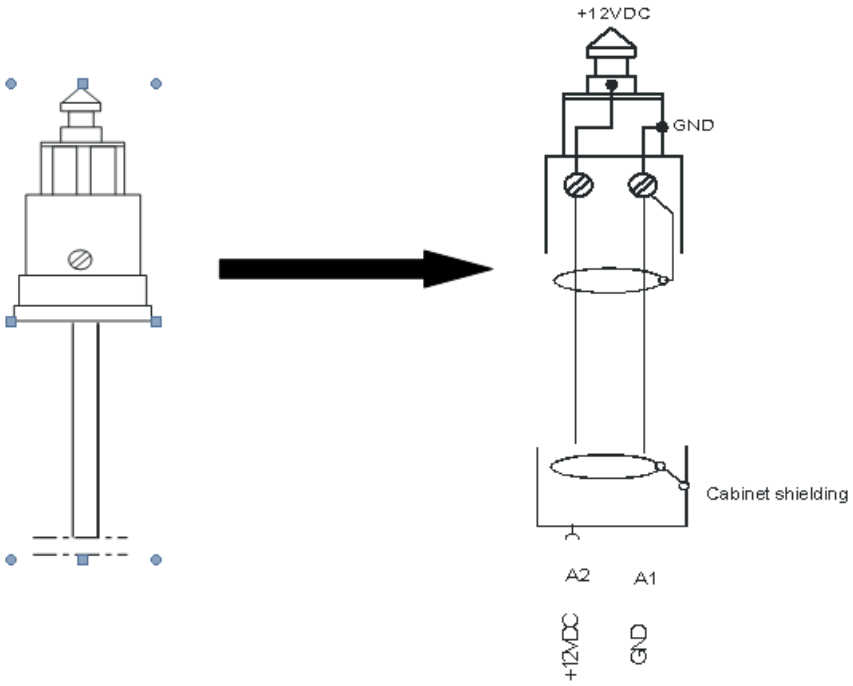


Fig. 2-1: Supplied power cable with cigarette lighter adaptor

DANGER

Danger of shock!

In order to avoid a shock hazard and instrument damage, note the following:

- After moisture condensation, allow the instrument to dry before switching on.
- The instrument is still power-supplied while it is in standby mode, that is, with the power button switched off, but still connected with the DC power supply.
- After connecting the power supply the instrument is immediately under power.
- The supplied DC connector is intended for disconnection.
- If any DC supply other than R&S TSME-Z1 is used:
  - The DC supply must be in accordance with IEC / EN / UL / CSA 60950-1 or IEC / EN / UL / CSA EN EN61010-1.
  - Use only Safety Extra Low Voltage (SELV) power supplies
  - Observe the DC input range of 10 V to 27 V with maximum of 1.8 A (inrush current)
  - The 12 V vehicle cigarette lighter socket must be fused

2.2.2 Setting Up the LAN Connection to the Host PC

As mentioned in chapter 1.2, "Measurement Setup", on page 5, a host PC or notebook with LAN interface is required in order to control and perform measurements with the R&S TSME.

The R&S TSME is equipped with a network interface and can be connected to an Ethernet LAN (local area network). The interface can be used to connect the R&S TSME to a host PC. It is recommended that each R&S TSME be connected to a host PC using a separate LAN adaptor.

This section describes how to configure the LAN interface. It includes the following topics:

- Configuring the LAN Interface on the Host PC 17
- Connecting the R&S TSME to the Host PC 21
- Configuring Multiple R&S TSMEs Connected to one Host PC 22

2.2.2.1 Configuring the LAN Interface on the Host PC

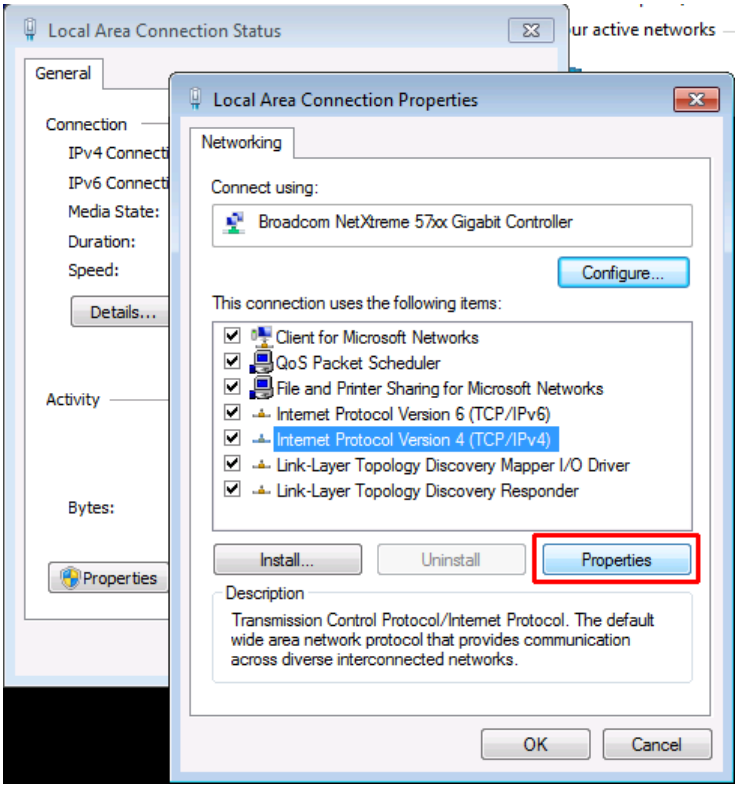
Each R&S TSME has the default IP address **192.168.0.2**. It is recommended that you define the fixed IP address **192.168.0.1** to the host PC.

In order to control the R&S TSME from the host PC, the LAN interface of the host PC must be configured as follows:

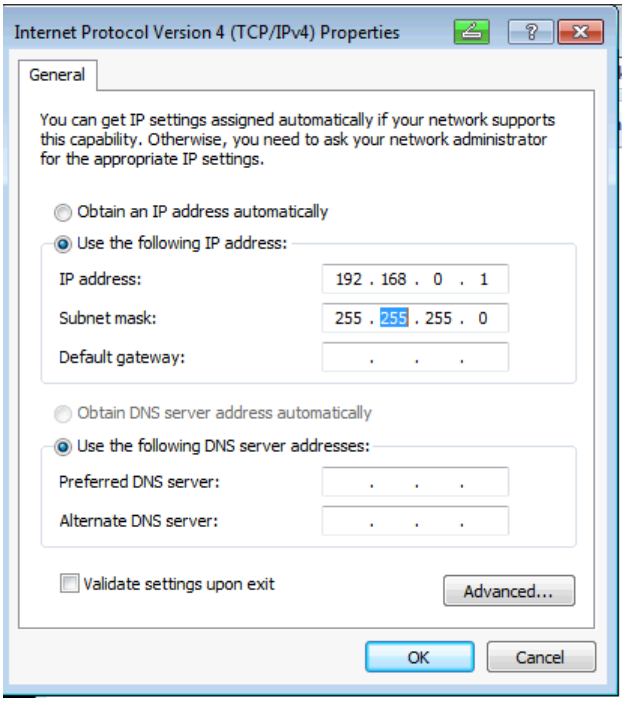
1. Press the "Windows" key or the CTRL + ESC key combination on your keyboard to access the Windows "Start" menu.
2. Select "Control Panel > Network and Internet > Network and Sharing Center".

3. Select "Change adaptor settings".
4. Double-click the LAN interface with which the R&S TSME is connected.

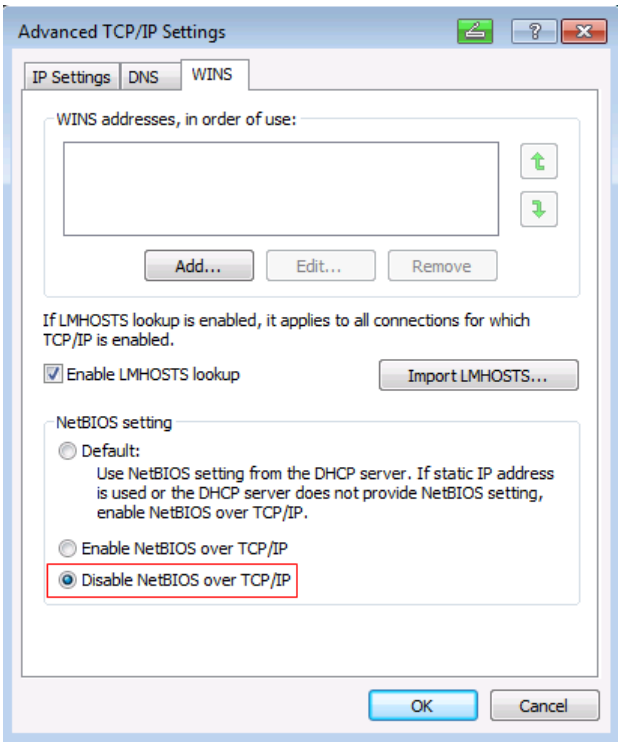
   The items used by the LAN connection are displayed.
5. Select the entry named "Internet Protocol Version 4 (TCP/IPv4)".



6. Select the "Properties" button.
7. Configure the following TCP/IP settings:
   - Select "Use the following IP address" (fixed IP, not dynamic)
   - IP address: **192.168.0.1** (recommended)
   - Subnet mask: 255.255.255.0
   - No Default Gateway

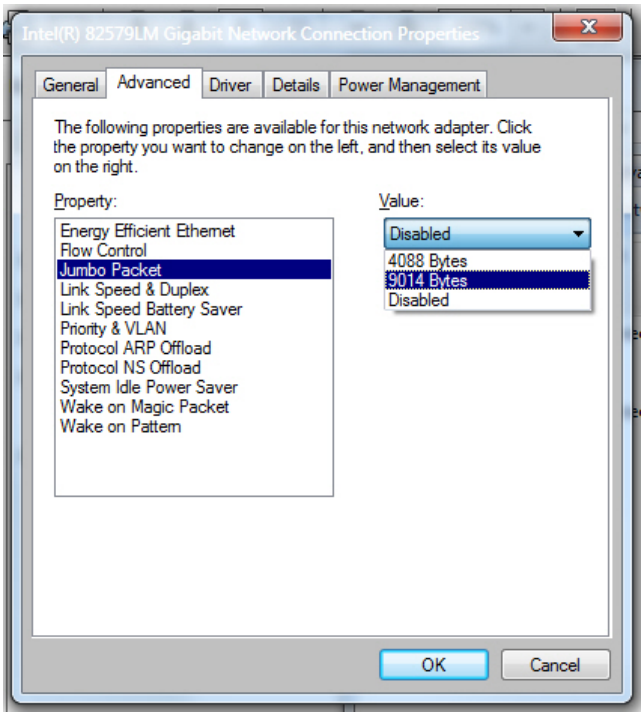

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 1
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

8. Select "Advanced" and switch to the "WINS" tab of the "Advanced TCP/IP Settings" dialog box.
9. Deactivate "NetBIOS over TCP/IP".


Advanced TCP/IP Settings
IP Settings
DNS
WINS
WINS addresses, in order of use:
Add...
Edit...
Remove
If LMHOSTS lookup is enabled, it applies to all connections for which TCP/IP is enabled.
Enable LMHOSTS lookup
Import LMHOSTS...
NetBIOS setting
Default:
Use NetBIOS setting from the DHCP server. If static IP address is used or the DHCP server does not provide NetBIOS setting, enable NetBIOS over TCP/IP.
Enable NetBIOS over TCP/IP
Disable NetBIOS over TCP/IP
OK
Cancel

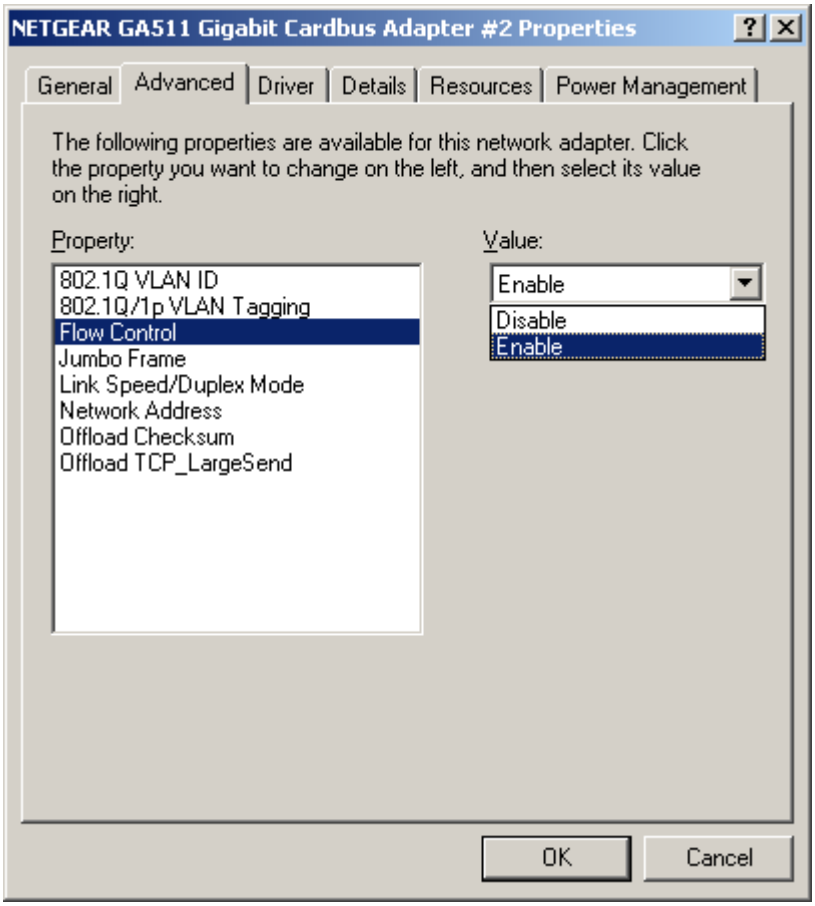
10. Enable the use of jumbo frames larger than 9 KB:

a) Return to the the "Local Area Connection Properties" dialog box.
b) Select the entry for the LAN adaptor and then "Properties".
c) Switch to the "Advanced" tab.



d) Select the "Jumbo Frames" property and a "Value" ≥ 9 KB.
Note: this setting may cause problems in Windows, but it is an important prerequisite for correct operation of the R&S TSME. See chapter 6.2, "Guide to Solving Instrument Connection Problems", on page 46 for help.

11. In the same dialog box, enable "Flow Control".



12. Close the Control Panel, reboot the host PC and check if the connection can be established successfully (see chapter 6, "Troubleshooting", on page 44).

Activating required ports

If your firewall is active make sure the following ports are available:

- Port 17476: Data transport between PC and R&S TSME

2.2.2.2 Connecting the R&S TSME to the Host PC

The R&S TSME has a built-in 1000BASE-T, (802.3ab) 1 Gbit/s Ethernet interface. The host PC must have a separate 1 Gbit network interface card with an independent LAN connection and a deactivated firewall.

Dedicated LAN adaptor and IP address for host PC

It is important for the host PC to have its own dedicated LAN adaptor for the connection to each R&S TSME, rather than being integrated in a regular office network.

Note that if multiple R&S TSMEs are connected to one host PC, it is important to define unique IP addresses for each instrument using the R&S TSME Device Manager (see chapter 4.3, "Changing the IP Address for Multiple R&S TSME Configuration", on page 34)

► Connect the supplied LAN cable to the LAN connector on the rear panel of the R&S TSME, and to the host PC.

Windows 7 automatically detects the network connection and all devices in the same subnet when the R&S TSME is switched on.

2.2.2.3 Configuring Multiple R&S TSMEs Connected to one Host PC

Particularly for MIMO measurement setups, multiple R&S TSMEs are required to receive multiple signals. In order to process all received signals in one application, the R&S TSMEs must be connected to the same host PC. In this case, each R&S TSME must be connected to the host PC using a separate network interface connector (NIC). The following graphic illustrates the setup for two R&S TSMEs connected to the same host PC in parallel, using a dual NIC adaptor on the PC and a synchronization cable between the R&S TSMEs.

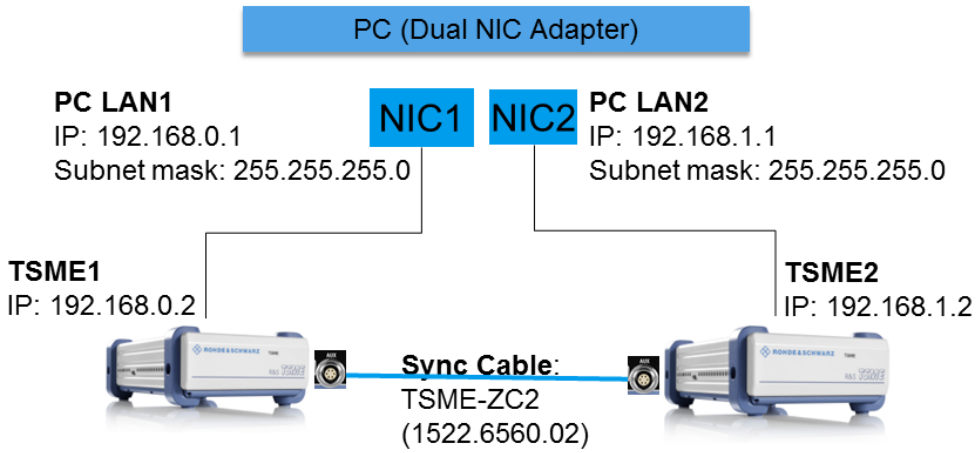


Fig. 2-2: Configuration for parallel R&S TSME usage

Each pair of R&S TSME and network interface connector is configured to be in a separate subnet.

To configure two R&S TSMEs connected to one host PC

1. In order to configure the network settings for both R&S TSMEs, set up the first LAN interface on the PC to use the following network settings, as described in chapter 2.2.2.1, "Configuring the LAN Interface on the Host PC", on page 17:
   - **IP address**: *192.168.0.1*
   - **Subnet mask**: *255.255.0.0*
2. Change the IP addresses of the R&S TSMEs so they are located in different subnets, as described in chapter 4.3, "Changing the IP Address for Multiple R&S TSME Configuration", on page 34.
   a) Start the R&S TSME Device Manager.
   b) Connect the first R&S TSME to the PC.
   c) Define the IP address: *192.168.0.2* (default).
   d) Connect the second R&S TSME to the PC.
   e) Define the IP address: *192.168.1.2*.
   f) Close the R&S TSME Device Manager.
3. Move the connector from the second R&S TSME to the second LAN adaptor.
4. Configure the LAN interfaces on the PC so they are located in the same subnets as the R&S TSMEs, using the following network settings, as described in chapter 2.2.2.1, "Configuring the LAN Interface on the Host PC", on page 17:

   LAN1: (already configured in step 1)
   - **IP address**: *192.168.0.1*
   - **Subnet mask**: *255.255.0.0*

   LAN2:
   - **IP address**: *192.168.1.1*
   - **Subnet mask**: *255.255.0.0*
5. Start the R&S TSME Device Manager.

   All connected and switched on R&S TSMEs should be displayed in the R&S TSME Device Manager.

(If not, see chapter 6, "Troubleshooting", on page 44.)

2.2.3 Connecting External Devices

The following external devices are required for standard operation (see also chapter 1.2, "Measurement Setup", on page 5):

- Connect the instrument to the power supply as described in chapter 2.2.1, "Connecting the DC Power Supply", on page 15.
- Connect the PC or notebook LAN port to the LAN port of the R&S TSME as described in chapter 2.2.2, "Setting Up the LAN Connection to the Host PC", on page 17.
- Connect the (optional) antenna's SMA-connector to the RF IN connector.

- Connect the GPS antenna to the GPS ANT connector of the instrument for time synchronization to a GPS signal (3V, max.100 mA for active antenna). It is strongly recommended that you use this function as it improves time synchronization.
- Optionally, connect a synchronization cable to the AUX connector if more than one R&S TSME are connected (option R&S TSME-ZC2 - Synchronization cable for 2 TSME, see table 1-1).

NOTICE

Risk of instrument damage

Do not overload the input power at the RF input connector, otherwise the input stage could be severely damaged. For maximum allowed values, see the data sheet.

2.2.4 Connecting a Kensington Lock

The R&S TSME provides a connector for a Kensington lock, which can be used to secure a mobile device against theft. The connector is located on the side panel of the instrument.

Fig. 2-3: Connector for a Kensington lock on the R&S TSME

2.3 Switching the Instrument On and Off

To switch on the instrument

1. Use the supplied power cable to connect the power supply to the instrument.
2. Press the On/Off key on the rear panel of the R&S TSME.

After booting, the instrument switches to the idle mode and is ready to be accessed by an application. (For details on instrument modes see chapter 6.1, "Overview of Instrument Modes", on page 44.)

Switching off and standby mode

When you press the On/Off key on the rear panel of the R&S TSME to switch it off, the instrument changes to standby mode. In standby mode, the program execution on the instrument is stopped immediately, but the instrument is still under power connection.

NOTICE

Switching off during connection process

Do not switch off the instrument while a connection to the application software is being established, otherwise the application might not be able to close properly. As a result, the software could crash and must be shut down from the Windows Task Manager.

Removing the power supply

If you remove the power supply and reconnect it later, the behaviour of the R&S TSME depends on the state of the instrument when the power was removed:

- **Standby mode**: the instrument returns to standby mode when power returns; must be switched on with the On/Off key
- **Any other operational mode:** the instrument automatically boots when power returns

2.4 Connecting the R&S TSME to a Software Application for the First Time

The following procedure describes the steps performed when you connect the R&S TSME to a software application (R&S ROMES, R&S ViCom) for the first time. Note that this process may take a few minutes initially.

1. Switch on the R&S TSME and the host PC.
2. Start the R&S ROMES / R&S ViCom application on the host PC.

   The application searches for R&S TSMEs connected to the host PC.
   If the R&S TSME is detected by the software for the first time, the software downloads the calibration files from the R&S TSME to the host PC. This may take a few minutes.
3. If the firewall settings have not been defined to include the R&S TSME applications, a Windows Security Alert may appear. In this case, allow the specified application module(s) to communicate **on all three network types** (domain, private, public).

4. The application checks which firmware versions are installed on the R&S TSME and which version was used to boot the R&S TSME. Up to three firmware versions can be stored on the R&S TSME.
   The following procedure depends on the detected version(s).
   - If the firmware version required by the application was used for booting, the application establishes a connection to the R&S TSME directly.
   - If the firmware version required by the application is available on the R&S TSME, but was not used for booting, the application reboots the R&S TSME using the required firmware version. Then the application establishes a connection to the R&S TSME.
   - If the firmware version required by the application is not yet available on the R&S TSME, the application uploads the required firmware version to the R&S TSME (this may take about one minute). The application reboots the R&S TSME using the required firmware version, then establishes a connection to the R&S TSME.
   - If the firmware version required by the application is not yet available on the R&S TSME, and all three storage spaces for firmware are occupied by other versions, the application must do the following:

   a) Clear all storage space for firmware versions on the R&S TSME (this may take about one minute).
   b) Upload the required firmware version to the R&S TSME (this may take about one minute).
   c) Reboot the R&S TSME using the required firmware version.
   d) Establish a connection to the R&S TSME.

2.5 Checking the Instrument

The R&S TSME provides an application named R&S TSME Device Manager to check the state of the instrument. Operation and maintenance can also be performed using this tool. See chapter 4.1, "The R&S TSME Device Manager", on page 31 for details.

The LEDs on the rear panel of the R&S TSME also indicate the state of the instrument, see table 3-1.

3 Front and Rear Panel Description

3.1 Front Panel

The front panel of the R&S TSME does not provide any connectors or control elements for operation.

Fig. 3-1: Front panel view

3.2 Rear Panel

Figure figure 3-2 provides an overview of the control elements and the connectors on the rear panel of the instrument.

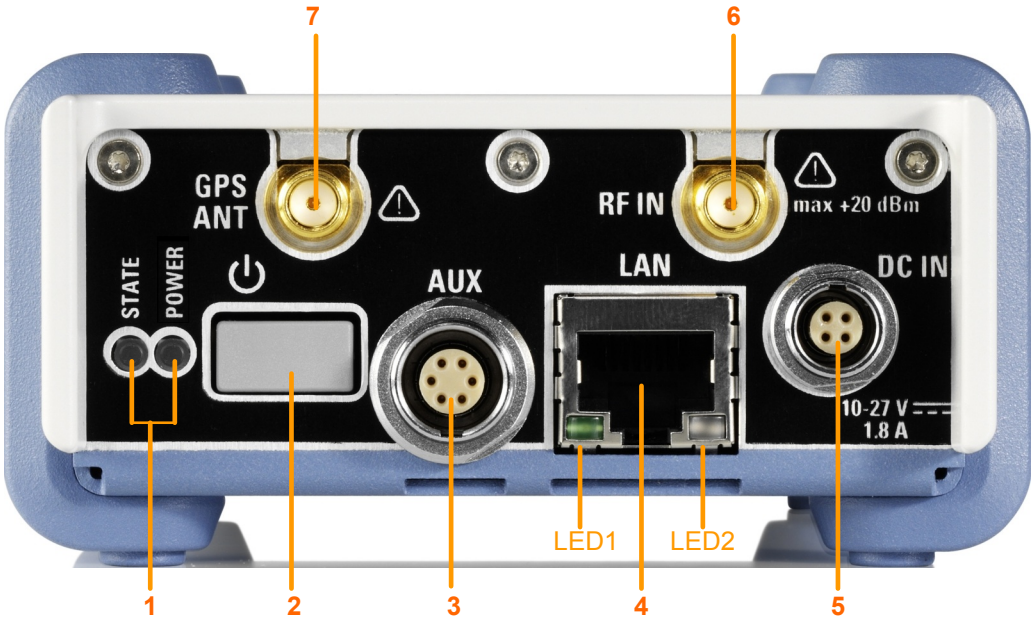


Fig. 3-2: Rear panel view

1 = STATE / POWER LEDs
2 = On/Off key
3 = AUX connector
4 = LAN connector with LEDs
5 = DC IN connector
6 = RF IN connector
7 = GPS antenna connector

STATE / POWER LEDs

The POWER and STATE LEDs indicate the operating status of the R&S TSME.

Table 3-1: POWER and STATE LED states and their meaning

STATE LED	POWER LED	Meaning
off	off	no power supply connected at DC IN power supply off power supply < 10 V
off	yellow	standby
off	green, blinking (2 Hz), then continuous	FGPA configuration finished (for a few seconds after power on)
red (< 5 s), then off	green	selftest passed (during power on cycle; after FPGA configurationis is finished)
green	green	conntected
green, blinking 1 Hz	green	measuring
green, blinking 5 Hz	green, blinking 5 Hz	The instrument is being identified by the software (see "Identifying the currently selected device" on page 34).

STATE LED	POWER LED	Meaning
red, blinking 1 Hz	-	warning
red (continous)	-	error
-	green	power on selftest
-	green	test

On/Off Key

The On/Off key switches the instrument on and off if power is supplied via the DC IN connector. For details see chapter 2.3, "Switching the Instrument On and Off", on page 24.

AUX Connector

The AUX connector can be used to connect additional devices, such as a signal generator that provides an external reference frequency for the R&S TSME, or a synchronization cable for multiple R&S TSMEs connected to one host PC.

LAN Connector

The LAN connector provides a highspeed Gigabit Ethernet interface with an RJ 45 connector using IPv4. It is required to connect the R&S TSME to a host PC.

For details see chapter 2.2.2, "Setting Up the LAN Connection to the Host PC", on page 17.

The LEDs on the LAN connector indicate the status of the connection to the host PC. LED 1 is on the left side of the connector, LED 2 is on the right.

Table 3-2: LAN LED 1 states and their meaning

LED state	Description
off	No connection
green, blinking	Identifying connected device
green	Connection established

Table 3-3: LAN LED 2 states and their meaning

LED state	Description
off	No connection
green, blinking	Identifying connected device
green	Connection established; receiving good frame (valid data) or sending
yellow	Connection error; bad frame received (invalid data)

DC IN Connector

The DC IN connector is required for the DC power supply (10-27 V, max. 1.8 A).

For details see chapter 2.2.1, "Connecting the DC Power Supply", on page 15.

RF IN 50 Ω Connector

The optional multi-band RF antenna (700 MHz to 2.6 GHz) or the device providing the RF signal is connected to the instrument's RF INPUT via a cable equipped with an appropriate connector (N female, 50 Ω input impedance, VSWR type 2.0).

NOTICE

Risk of instrument damage

Do not overload the maximum allowed input of 20dBm. Noncompliance will destroy the input mixer.

GPS antenna connector

An SMA connector is provided for the supplied external active GPS antenna.

Antenna power: 3V, max. 25mA

4 Basic R&S TSME Functions

Measurements are performed on the R&S TSME via the R&S ROMES and R&S ViCom interfaces. Depending on the installed software options, the network is either scanned for individual standards, or globally over all frequency bands. Details on scanning networks are described in the R&S ROMES and R&S ViCom manuals.

Basic device configuration tasks can be performed directly on the R&S TSME, via the host PC, using the R&S TSME Device Manager.

4.1 The R&S TSME Device Manager

The R&S TSME Device Manager is a configuration software tool for the R&S TSME. This utility is part of the R&S®TSME installation package. It can also be installed together with R&S ROMES and R&S ViCom, and is available for download from the Rohde & Schwarz product website http://www2.rohde-schwarz.com/product/TSME.html.

It provides the following tasks:

- Reading device information, such as:
  - Correction data status
  - Device temperatures
  - HW version
  - FPGA versions
  - Serial number
  - Warnings, errors or information concerning the device status
- Reading and setting the device's IP-address
- Reading and installing options
- For R&S TSMEs with limited band options:
  - Reading which bands are currently configured on the device
  - Changing the band configuration
- Updating basic FPGA and correction data

Administrator rights required

Note that the R&S TSME Device Manager requires administrator rights on the host PC in order to operate correctly.

To start the R&S TSME Device Manager

► To start the R&S TSME Device Manager, double-click the desktop icon or select the "R&S®TsmeTools" program entry in the Windows "Start" menu.

If a connection to this application cannot be established correctly, check the firewall settings (see chapter 6.2, "Guide to Solving Instrument Connection Problems", on page 46)

When you start the R&S TSME Device Manager, the following dialog box is displayed:

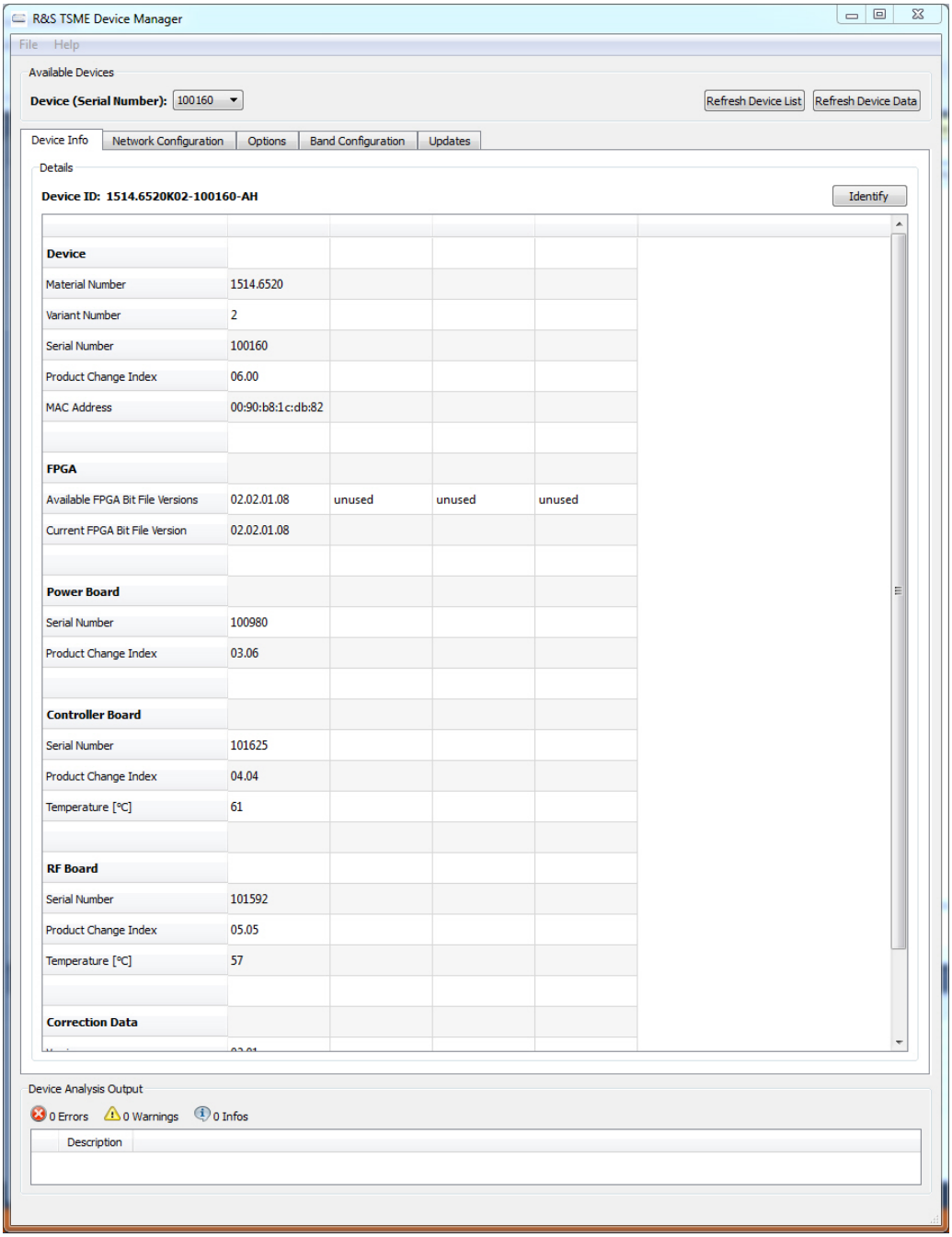


Fig. 4-1: R&S TSME Device Manager

Selecting the device
The R&S TSME Device Manager can configure any connected R&S TSME that the software detects in the LAN. The individual devices are identified uniquely by their serial number. By selecting one of the "Available Devices" by its serial number in the R&S TSME Device Manager dialog box you determine which R&S TSME the current configuration applies to.

Updating the device selection list
If additional R&S TSMEs become available after the R&S TSME Device Manager has started, you must select the "Refresh Device List" button so the new devices are included in the "Available Devices" list.

Updating the displayed device data
If the current configuration or device information has changed and is not yet displayed correctly in the R&S TSME Device Manager, select the "Refresh Device Data" button to update the display.

4.2 Obtaining Device Information

The most important configuration settings for each available R&S TSME are displayed in the "Device Info" tab of the R&S TSME Device Manager (see figure 4-1).

This includes the following information:

Table 4-1: R&S TSME device information

Label	Description
Device	
Material Number	Order number of the R&S TSME
Variant Number	Precise device type (variant)
Serial Number	Unique ID of the R&S TSME
Product Change Index	Version of the device
MAC Address	Network address of the R&S TSME
FPGA	
Available FPGA Bit File Versions	Previous firmware version backups stored on the device (see also "Automatic firmware updates" on page 41)
Current FPGA Bit File Version	Currently used firmware version
Power Board	
Serial Number	Unique ID of the power board
Product Change Index	Version of the power board
Controller Board	
Serial Number	Unique ID of the controller board
Product Change Index	Version of the controller board

Label	Description
Temperature	Current temperature of the hardware in [°]C
RF Board	
Serial Number	Unique ID of the RF board
Product Change Index	Version of the RF board
Temperature	Current temperature of the hardware in [°]C
Correction Data	
Version	N-test version used for correction data
Date	Date of most recent correction data
TCXO Date	Date of correction data for the internal reference

Furthermore, any warnings, errors or information concerning the device status that may be available are displayed in the "Device Analysis Output" table. This table is available on all tabs, at the bottom of the R&S TSME Device Manager window.

In case measurement problems occur with the R&S TSME, check the "Device Analysis Output" table for any errors that may have been dectected.

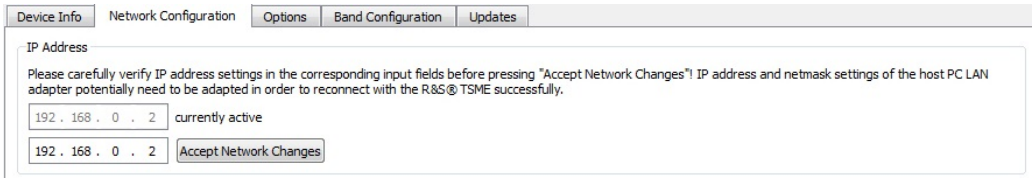
Identifying the currently selected device
If several R&S TSMEs are connected to the host PC and are detected by the R&S TSME Device Manager, you may not be able to determine which of the (physical) devices is currently selected for configuration. When you select the "Identify" button, the STATE LED and the LAN LEDs on the rear panel of the device with the selected serial number start blinking rapidly for several seconds.

4.3 Changing the IP Address for Multiple R&S TSME Configuration

By default, each R&S TSME is delivered with the pre-configured IP address **192.168.0.2**. However, if multiple R&S TSMEs are connected to the same host PC, each device must have a unique IP address.

You can change the IP address for the connected R&S TSMEs directly via the R&S TSME Device Manager. If necessary, the LAN adaptor settings on the host PC must also be adapted accordingly in order to reconnect with the R&S TSME (see also chapter 2.2.2, "Setting Up the LAN Connection to the Host PC", on page 17). In particular, the host PC (LAN adaptors) must use the subnet in which the IP addresses of the R&S TSMEs are located.

Define the IP address in the "Network Configuration" tab of the R&S TSME Device Manager. The currently active IP address for the selected R&S TSME is displayed for reference. It remains active until you select the "Accept Network Changes" button.


Device Info
Network Configuration
Options
Band Configuration
Updates
IP Address
Please carefully verify IP address settings in the corresponding input fields before pressing "Accept Network Changes"! IP address and netmask settings of the host PC LAN adapter potentially need to be adapted in order to reconnect with the R&S® TSME successfully.
192 . 168 . 0 . 2
currently active
192 . 168 . 0 . 2
Accept Network Changes

Applying changes to the LAN configuration
Changes to the IP Address configuration in the R&S TSME Device Manager are only applied when you select the "Accept Network Changes" button. The re-configured R&S TSME is then accessible only via the new IP address.

4.4 Installing and Managing Software License Keys

All new devices are preconfigured and specified technology and band options are already installed. Only if you obtain additional software options later you have to enable the options with the corresponding software license keys.

License keys are shipped as a printed "License Keys List". Advance deliveries may consist of a PDF file. Unregistered software licenses can be downloaded from the Rohde & Schwarz website (https://extranet.rohde-schwarz.com/service). For details see the "Installation Instructions for Options".

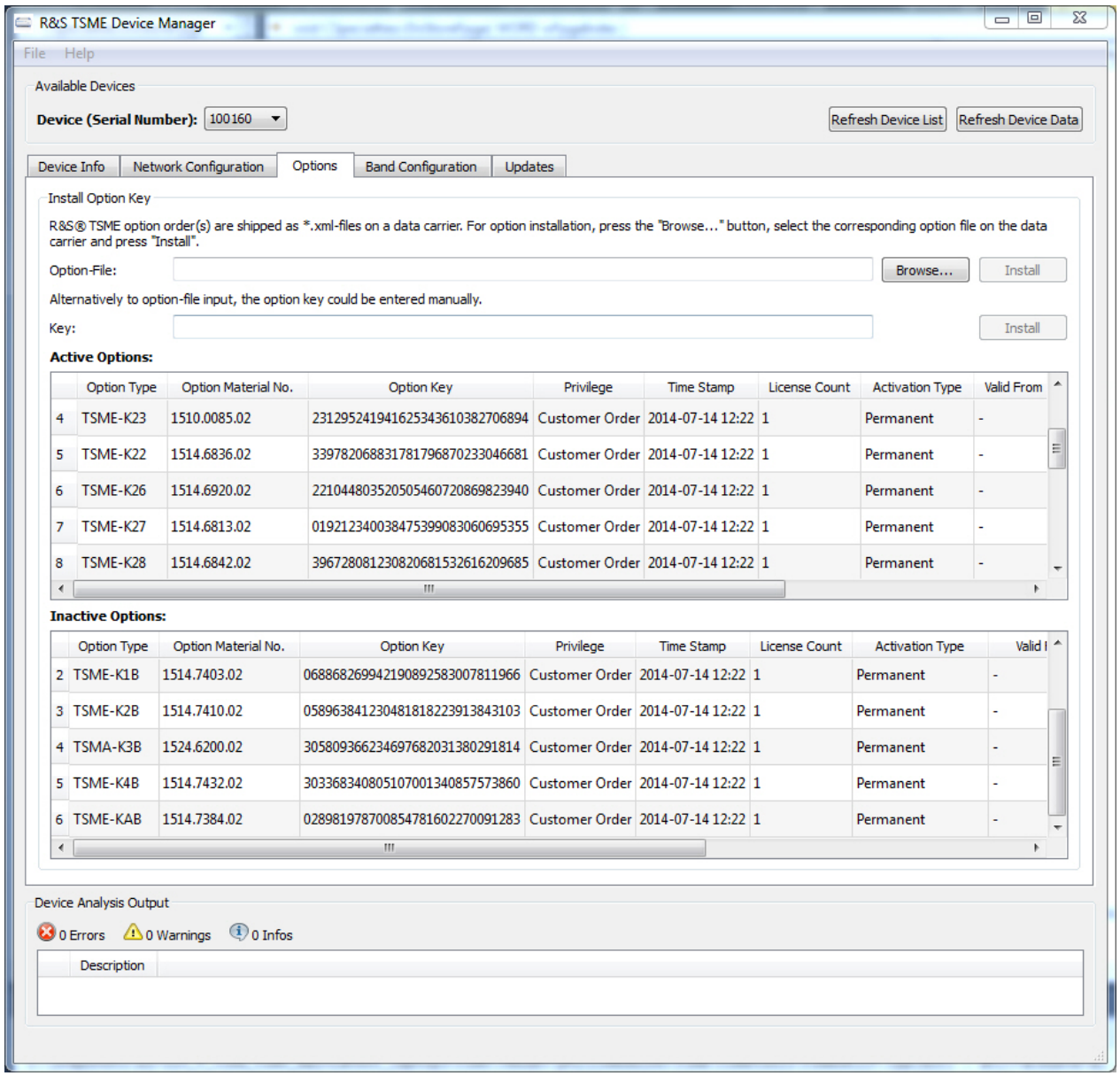
(Note: previously, license keys were shipped as xml files.)

Prerequisites to install software license keys

In order to install a software license key, the following conditions must apply:

- PC/notebook is connected via Gbit LAN adaptor, with Jumbo Frames (>9 kB) enabled
- The (registered) software license key must be available
- The R&S TSME is in idle mode, that is, it is switched on but no other software application is interacting with the R&S TSME (see chapter 6.1, "Overview of Instrument Modes", on page 44).

Software license keys are installed using the R&S TSME Device Manager, in the "Options" tab.


R&S TSME Device Manager
File Help
Available Devices
Device (Serial Number): 100160
Refresh Device List
Refresh Device Data
Device Info
Network Configuration
Options
Band Configuration
Updates
Install Option Key
R&S® TSME option order(s) are shipped as *.xml-files on a data carrier. For option installation, press the "Browse..." button, select the corresponding option file on the data carrier and press "Install".
Option-File:
Browse...
Install
Alternatively to option-file input, the option key could be entered manually.
Key:
Install
Active Options:
Option Type | Option Material No. | Option Key | Privilege | Time Stamp | License Count | Activation Type | Valid From
4 TSME-K23 | 1510.0085.02 | 231295241941625343610382706894 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
5 TSME-K22 | 1514.6836.02 | 339782068831781796870233046681 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
6 TSME-K26 | 1514.6920.02 | 221044803520505460720869823940 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
7 TSME-K27 | 1514.6813.02 | 019212340038475399083060695355 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
8 TSME-K28 | 1514.6842.02 | 396728081230820681532616209685 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
Inactive Options:
Option Type | Option Material No. | Option Key | Privilege | Time Stamp | License Count | Activation Type | Valid
2 TSME-K1B | 1514.7403.02 | 06886826994219089258300781 1966 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
3 TSME-K2B | 1514.7410.02 | 058963841230481818223913843103 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
4 TSMA-K3B | 1524.6200.02 | 305809366234697682031380291814 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
5 TSME-K4B | 1514.7432.02 | 303368340805107001340857573860 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
6 TSME-KAB | 1514.7384.02 | 028981978700854781602270091283 | Customer Order | 2014-07-14 12:22 | 1 | Permanent | -
Device Analysis Output
0 Errors
0 Warnings
0 Infos
Description

For each option, the following information is displayed:

Information for options that are no longer valid because their expiry date has passed are listed as "Inactive Options".

To replace temporary by permanent software license keys, contact your Rohde & Schwarz sales representative.

Table 4-2: Software license key information

Label	Description
Option Type	Band or technology option name
Option Material No.	Order number of the option

Label	Description
Option key	Software license key number
Privilege	Usage type (customer, services, demo)
Time Stamp	Time the software license key was installed
License Count	Number of times the (band upgrade) option is installed
Activation Type	Activation can be permanent or temporary
Valid From	Start of validity for temporary license
Valid To	End of validity for temporary license
Time to Expiration	Time left until license expires
Option Index	for internal use only
Format ID	for internal use only

Finding the software license key files
Previously, license keys were shipped as xml files. This function is only available for compatibility reasons.

If you do not know the precise path and file name of the required software license key, you can browse through the host PC's file system directly from the R&S TSME Device Manager, by selecting the "Browse" button in the "Options" tab.

Entering key codes
Enter the 30-digit key code from the "License Keys List" in the "Key" field.

Alternatively, if available, copy the key code from the supplied PDF license key file and paste it in the "Key" field.

To install the software license key on the currently selected R&S TSME, select the "Install" button (see "Installing a software license key" on page 37).

Installing a software license key
The software license key for which you have entered the key code in the R&S TSME Device Manager is installed on the currently selected R&S TSME when you select the "Install" button. It then appears in the "Active Options" list with its validity dates and other information (see table 4-2).

4.5 Obtaining Firmware and Correction Data Updates

The R&S TSME Device Manager is always provided with the most recent basic FPGA (section 0). If a newer one becomes available due to security or functional issues, a message is indicated in the "Device Analysis Output" at the bottom of the R&S TSME Device Manager window. In this case, and only in this case, it is recommended that you install this update on your R&S TSME.

The correction data on your R&S TSME should always be kept up-to-date. Available updates are also indicated in the "Device Analysis Output" and it is recommended that you install them.

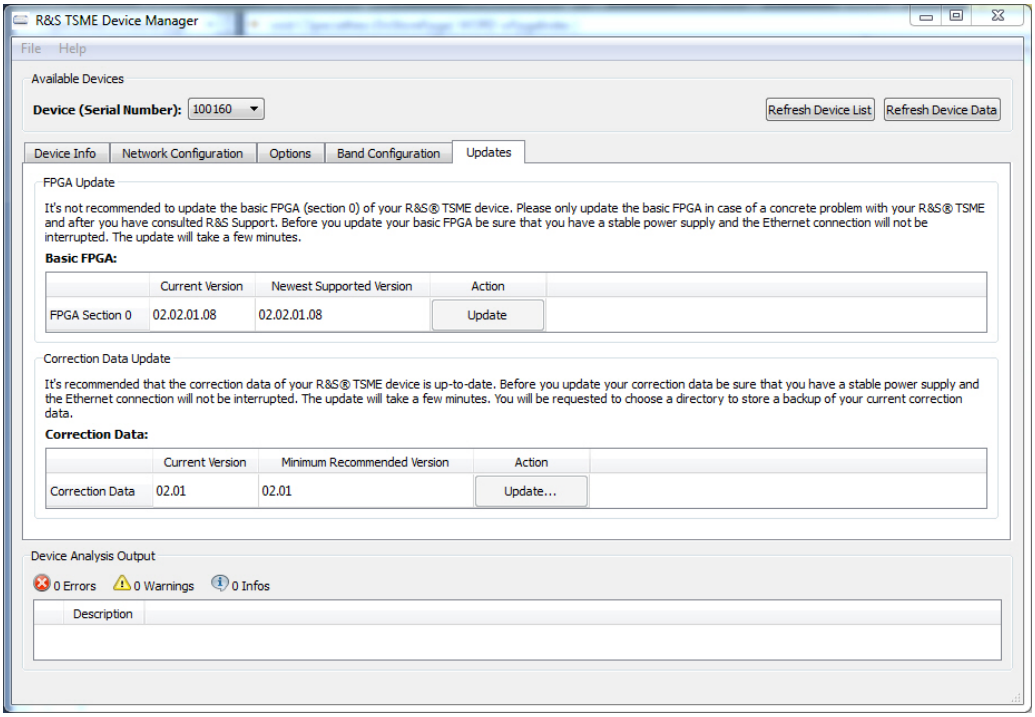
NOTICE

Risk of inoperability of device due to FPGA update

Before performing an update, make sure you have a stable power supply and the LAN connection will not be interrupted. Both updates take a few minutes.

If the LAN connection is interrupted during an FPGA update, the device may become inoperable. Thus, only install such an update if it is explicitely recommended by a message in the "Device Analysis Output" of the R&S TSME Device Manager or by the Rohde & Schwarz support center.

You can update the basic FPGA or the correction data on your R&S TSME directly from the R&S TSME Device Manager, in the "Update" tab. The currently installed versions and the newest supported version (of the FPGA) or the minimum recommended version (of the correction data) are indicated.


R&S TSME Device Manager
File Help
Available Devices
Device (Serial Number): 100160
Refresh Device List
Refresh Device Data
Device Info
Network Configuration
Options
Band Configuration
Updates
FPGA Update
It's not recommended to update the basic FPGA (section 0) of your R&S® TSME device. Please only update the basic FPGA in case of a concrete problem with your R&S® TSME and after you have consulted R&S Support. Before you update your basic FPGA be sure that you have a stable power supply and the Ethernet connection will not be interrupted. The update will take a few minutes.
Basic FPGA:
Current Version
Newest Supported Version
Action
FPGA Section 0
02.02.01.08
02.02.01.08
Update
Correction Data Update
It's recommended that the correction data of your R&S® TSME device is up-to-date. Before you update your correction data be sure that you have a stable power supply and the Ethernet connection will not be interrupted. The update will take a few minutes. You will be requested to choose a directory to store a backup of your current correction data.
Correction Data:
Current Version
Minimum Recommended Version
Action
Correction Data
02.01
02.01
Update...
Device Analysis Output
0 Errors
0 Warnings
0 Infos
Description

To perform an update

1. In the R&S TSME Device Manager, select the serial number of the R&S TSME to be updated.
2. In the "Update" tab, select the "Update" button for either the basic FPGA or the correction data.

When updating the correction data, you are asked to select a directory to store a backup of your current correction data.

4.6 Configuring Measurement Bands

Depending on which options are installed, various different bands and technologies can be scanned by the R&S TSME.

Before you can configure the measurement bands you must install all required software license keys, see chapter 4.4, "Installing and Managing Software License Keys", on page 35.

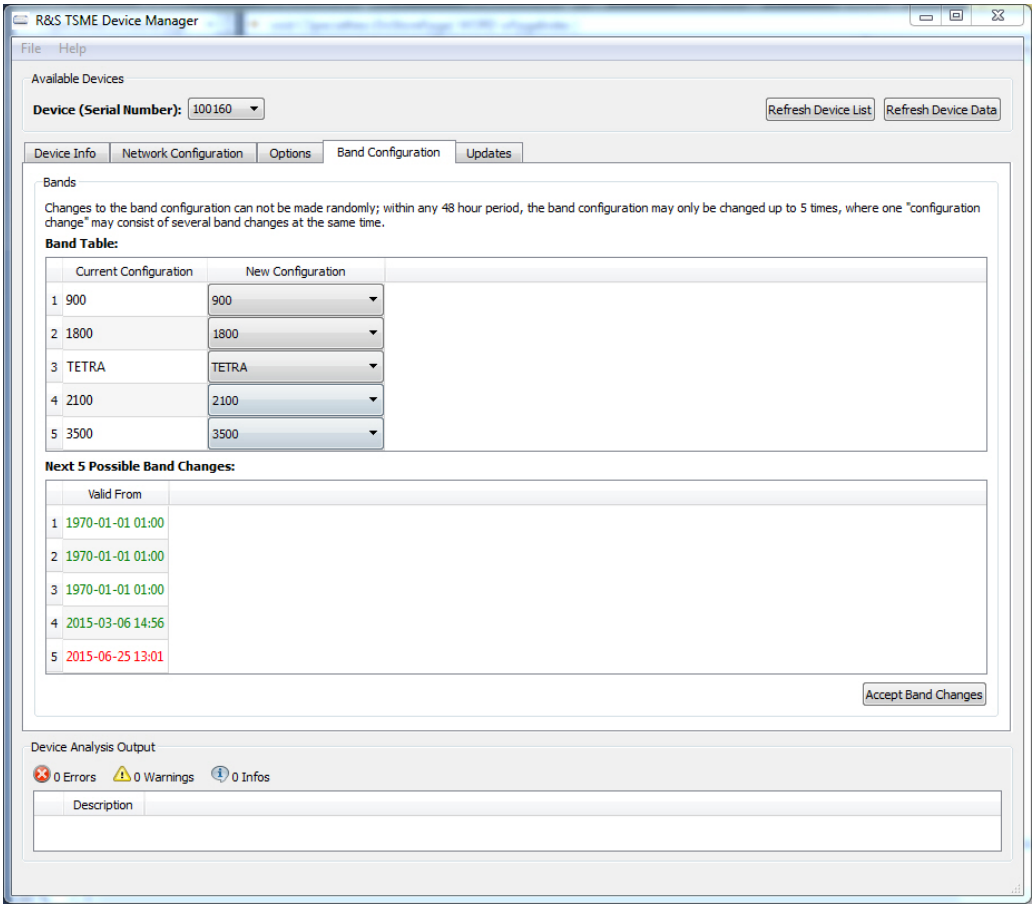
The band configuration is stored on the R&S TSME and does not have to be performed every time you switch on the device.

When using a R&S TSME with a limited number of measurement bands (see chapter 1.3.2, "Band Options", on page 11), you must consider the band configuration of the scanner when planning a measurement task. The scanner will only provide measurement results for those bands that are currently configured on the scanner.

Example:

A R&S TSME is configured with band option TSME-K2B (2 bands measured simultaneously). During the last measurement, the R&S TSME was used to perform measurements in 900 MHz and 1800 MHz bands. For the next measurement, the R&S TSME can still only be used in 900 MHz and 1800 MHz bands, unless you change the band configuration using the R&S TSME Device Manager.

The band configuration is defined in the "Band Configuration" tab of the R&S TSME Device Manager. Select the bands that are to be scanned by the R&S TSME in the "Band Table". Which bands are available is independent of the installed *technology* options; all installed technologies can be scanned in all configured bands at the same time. The *number* of bands available for selection depends on the installed band options (see chapter 1.3.2, "Band Options", on page 11).



The current band configuration for the selected R&S TSME is displayed for reference. It remains active until you select the "Accept Band Changes" button.

Band configuration changes

Changes to the band configuration can not be made randomly; within any 48 hour period, the band configuration may only be changed up to 5 times (where one "configuration change" may consist of several band changes at the same time, see "Applying band configuration changes" on page 40). A counter is decremented after each (applied) change. How many changes have already been performed and how many are still possible within the current time frame is displayed at the bottom of the "Band Configuration" tab of the R&S TSME Device Manager. Red dates indicate the changes recently made, while green dates indicate possible changes left.

Applying band configuration changes

Changes to the band configuration are only applied to the R&S TSME when you select the "Accept Band Changes" button in the "Band Configuration" tab of the R&S TSME Device Manager.

Only then the counter for possible band changes (within 48 hours) is decremented.

4.7 Interacting with R&S ROMES and R&S ViCom

Measurements are performed on the R&S TSME via the R&S ROMES and R&S ViCom interfaces. Depending on the installed technology options, the network is either scanned for individual standards, or globally over all frequency bands.

An R&S TSME together with the R&S ROMES or R&S ViCom interface and the required technology options provides the following features:

- Parallel support of multiple wireless communications technologies
- Simultaneous measurements of GSM, WCDMA, CDMA2000®, 1xEVDO, WiMAX, TETRA and LTE technologies
- Calculation of base station locations from scanner measurements via R&S ROMES software plus GPS position measurements plus high accuracy PPS
- Power scans over the entire frequency range from 350 MHz to 4400 MHz
- Simple scanner setup

The following sections briefly describe the basic requirements for interaction between the R&S TSME and the R&S ROMES or R&S ViCom interfaces. For details on using these interfaces see the R&S ROMES and R&S ViCom manuals.

4.7.1 Interacting with R&S ROMES

Prerequisites

In order to perform measurements with the R&S ROMES application, the following pre-requisites apply:

- R&S ROMES Installation (refer to R&S ROMES manual)
- R&S ROMES option on dongle inserted (refer to R&S ROMES manual)
- Technology options R&S TSME-K2x installed on the R&S TSME (see chapter 4.4, "Installing and Managing Software License Keys", on page 35)

After the R&S TSME has finished booting, start the R&S ROMES software application.

If a connection to this application cannot be established correctly, check the firewall settings (see chapter 6.2, "Guide to Solving Instrument Connection Problems", on page 46)

Automatic firmware updates

Each time R&S ROMES is started, the software automatically compares the firmware version of the connected R&S TSME with the version currently available on the host PC. If a newer version is available, it is copied to and installed on the R&S TSME. Up to two previously installed firmware versions are stored as backups and maintained on the R&S TSME (see also table 4-1). Thus, it is not necessary to perform firmware updates on the R&S TSME manually.

For details and information on how to configure R&S ROMES and carry out measurements with the R&S TSME, refer to the R&S ROMES manual.

4.7.2 R&S ViCom Programming Interface

R&S ViCom interface is a software package to develop software applications which integrate the R&S TSME as an OEM product into customer software.

The R&S ViCom package, which is part of the shipment, must be installed on the host PC. It includes documentation and sample applications.

Scanner Options

In order to interact with the R&S TSME via the R&S ViCom interface, the corresponding scanner options must be installed on the device. Open the R&S TSME Device Manager to see the which scanner options are installed on the device (see chapter 4.4, "Installing and Managing Software License Keys", on page 35).

For details and information on how to configure the R&S ViCom interface and carry out measurements with the R&S TSME, refer to the R&S ViCom manual.

If a connection to this application cannot be established correctly, check the firewall settings (see chapter 6.2, "Guide to Solving Instrument Connection Problems", on page 46)

5 Maintenance

NOTICE

Instrument damage caused by cleaning agents

Cleaning agents contain substances that may damage the instrument. For example, cleaning agents that contain a solvent may damage the front panel labeling, plastic parts, or the display.

Never use cleaning agents such as solvents (thinners, acetone, etc), acids, bases, or other substances.

The outside of the instrument can be cleaned sufficiently using a soft, lint-free dust cloth.

NOTICE

Risk of instrument damage during transportation and shipment

Insufficient protection against mechanical and electrostatic effects during transportation and shipment can damage the instrument.

- Always make sure that sufficient mechanical and electrostatic protection is provided.
- When shipping an instrument, the original packaging should be used. If this is not available, allow for sufficient padding to prevent the instrument from moving around inside the box. Pack the instrument in antistatic wrap to protect it from electrostatic charging.
- Secure the instrument to prevent any movement and other mechanical effects during transportation.

Firmware updates

You do not have to update the firmware on the R&S TSME manually. If necessary, firmware updates are downloaded from the host PC application (R&S ROMES or R&S ViCom) automatically when the connection is established (see "Automatic firmware updates" on page 41).

Self-Alignment

You do not have to perform any alignment on the R&S TSME manually. However, the R&S TSME automatically performs continuous self-alignment measurements when the device is in connected mode and under control by the host PC, but not in measurement mode (for example it is loaded in ROMES, but no measurement is being performed, see also chapter 6.1, "Overview of Instrument Modes", on page 44). During self-alignment, the R&S TSME determines alignment values for the I/Q filter, ADC offset and the I/Q imbalance. Note, however, that self-alignment is only performed for antenna levels under -45 dBm.

6 Troubleshooting

If errors occur during operation or connection of the R&S TSME, the following information may help you solve the issue.

Most errors that may occur during measurements with the R&S TSME are indicated in the host PC software (e.g. R&S ROMES or the R&S ViCom application) and must be solved within the software. This chapter refers only to errors that occur directly on the R&S TSME.

In case measurement problems occur with the R&S TSME, check the "Device Analysis Output" table in the R&S TSME Device Manager for any errors that may have been dectected as a first measure (see chapter 4.1, "The R&S TSME Device Manager", on page 31).

6.1 Overview of Instrument Modes

Depending on the current operation and connection state of the R&S TSME, the instrument is considered to be in different modes. The possible modes and how to identify them are described here.

The meaning of the individual LED states is described in chapter 3.2, "Rear Panel", on page 27.

Initial power on sequence

When the R&S TSME is supplied with power and switched on the first time after delivery, it automatically boots, performing the following steps before it is ready for operation:

1. FPGA configuration - indicated by a blinking green POWER LED.
2. Self test complete - indicated by a steady green POWER LED.
   The red STATE LED lights up briefly.
3. Idle mode

Idle mode

The state after booting has completed and before any connections have been established is referred to as *idle mode*.

This state is indicated by a green POWER LED; the STATE LED is off.

If you remove the power supply while the instrument is switched on and reconnect it later, the R&S TSME automatically boots again.

Connected mode

As soon as the host PC (R&S ROMES or customer application with R&S ViCom or R&S TSME-K1) accesses the R&S TSME via the LAN interface and configures the measurement, the R&S TSME switches to *connected mode*.

After finishing the firmware download and completing some initialization routines the R&S TSME is then ready for measurement commands sent from R&S ROMES or R&S ViCom.

When the instrument is in connected mode and under control by the host PC, the STATE LED is green.

Measuring mode

The instrument switches to *measuring mode* immediately after receiving any “Start Measurement/Recording” command from the host PC software. For information on how to carry out instrument measurements with R&S ROMES or R&S ViCom, refer to the R&S ROMES R&S TSME Programming Interface and the R&S ViCom Programming Interface manuals.

In measuring mode the STATE LED blinks green.

Standby mode

When you press the "On/Off" key on the rear panel of the R&S TSME, the instrument switches to *standby mode*. Program execution on the instrument is stopped immediately, but the instrument is still under power connection. The POWER LED is yellow, all other LEDs are off.

If you remove the power supply in standby mode and reconnect it later, the R&S TSME switches back to standby mode and does not automatically boot. You must press the "On/Off" key first to start booting.

Error mode

If an error occurs during operation and no measurements are possible, the R&S TSME falls into *error mode*.

The STATE LED turns red. If possible, warnings or errors are indicated in the "Device Analysis Output" table of the R&S TSME Device Manager (see chapter 4.2, "Obtaining Device Information", on page 33).

The following diagram shows the order in which the R&S TSME goes through the various instrument modes.

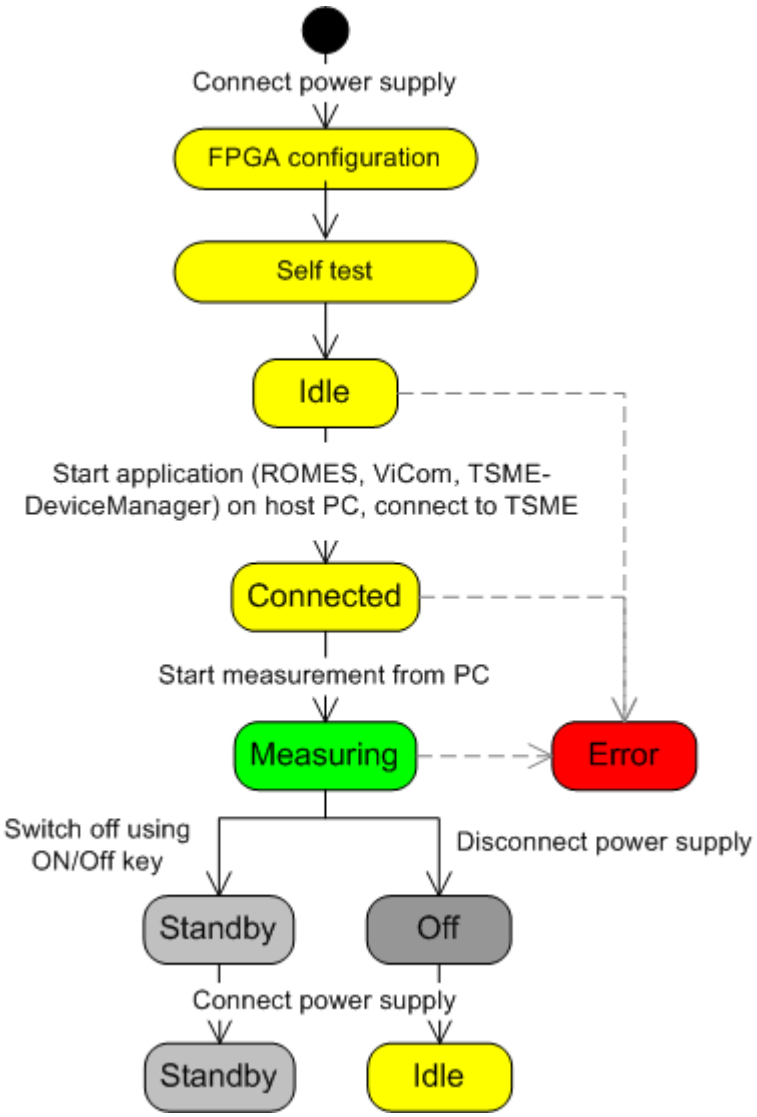


Fig. 6-1: R&S TSME instrument modes

6.2 Guide to Solving Instrument Connection Problems

The following flow-diagram demonstrates how to check the LAN connection to the instrument when initial connection fails:

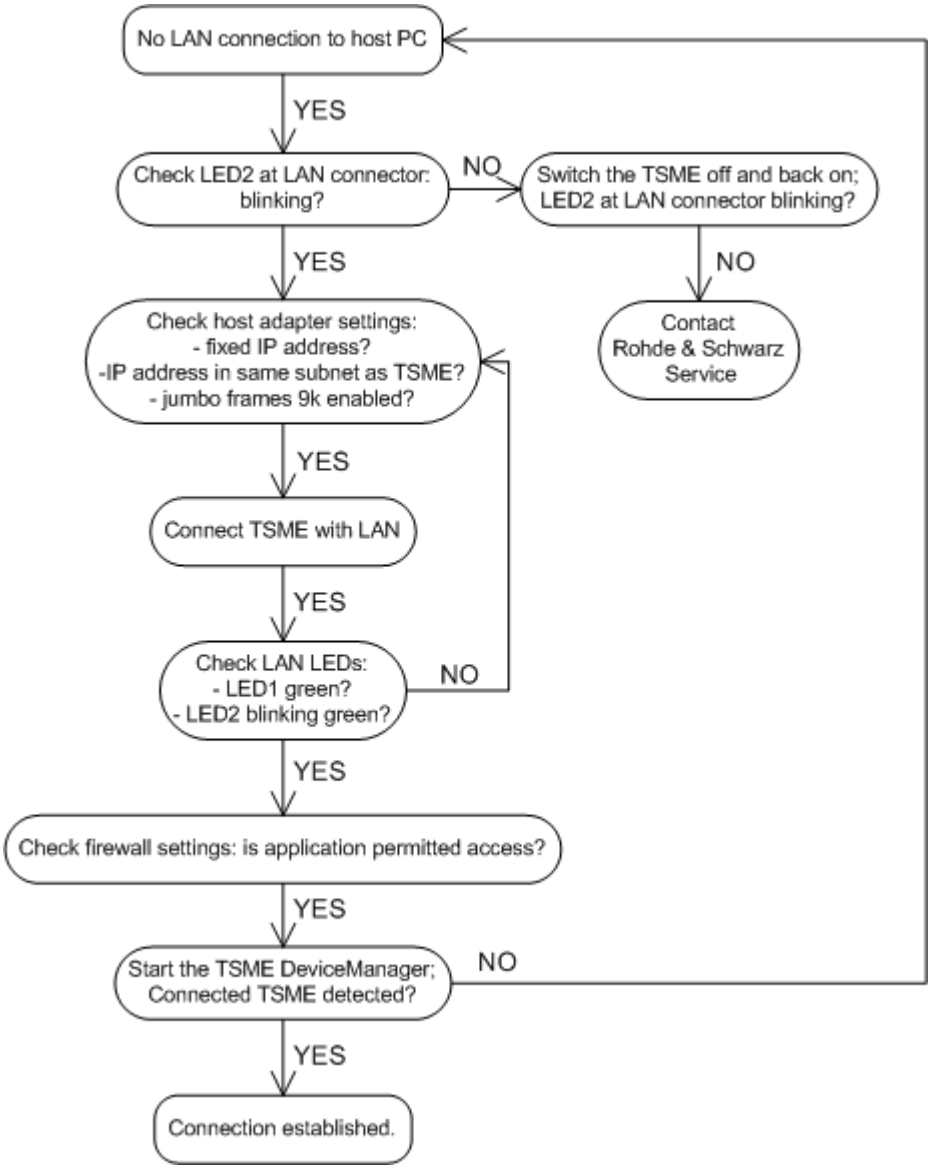


Fig. 6-2: Troubleshooting: LAN Connection

The following information may provide further solutions to frequent connection problems.

- Does the host provide a **GBit LAN connector** and support **9k jumbo frames**? In some cases the Windows network adaptor properties show that 9k are enabled, but in fact the adaptor does not support the setting. You can **check this** using this command:
  `netsh interface ipv4 show interfaces`
  The "MTU" value in each line indicates the maximum transmission unit. Make sure the LAN adaptor connected to the R&S TSME supports an MTU larger than 9000.

```
C:\Users\GASSLBAU>netsh interface ipv4 show interfaces

Idx     Met         MTU          State                Name
---  ----------  ----------  ------------  ---------------------------
  1          50  4294967295  connected     Loopback Pseudo-Interface 1
 12          25        1500  disconnected  Wireless Network Connection
 17           5        1500  disconnected  Wireless Network Connection 2
 11          10        1500  connected     Local Area Connection
 16          10        9000  disconnected  Local Area Connection 2
```

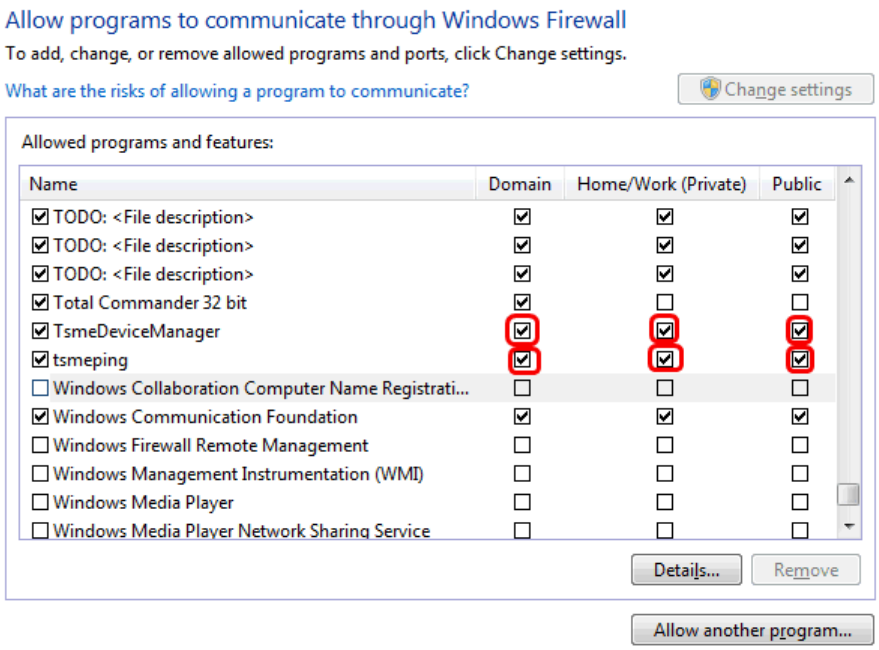
If the 9k jumbo frames cannot be enabled in the Windows dialog box, try the following command:

```
netsh interface ipv4 set subinterface [Idx] mtu=9000
store=persistent
```

where [Idx] is the network Id of the LAN adaptor

For more information on the required settings see "Important requirements for host PC" on page 6.

- Does the **firewall** permit access to the R&S TSME applications?
  In the Windows Control Panel, select "System and Security > Windows Firewall > Allow programs to communicate through Windows Firewall".



Select the programs required for communication, and select **all three network types** (domain, private, public).
In particular, select:

– TSME Device Manager Application
– tsmeping

If necessary, also select the following programs:

– R&S ROMES
  + Dll Loader for PHYLIS Modules
– R&S ViCom

+ Dll Loader for PHYLIS Modules

- Is the R&S TSME connected to the host PC properly?
  Currently the R&S TSME does not answer to ICMP echo requests (PING). However, for ViCom users, a R&S TSME **Ping** tool is available after installation of R&S ViCom (`C:\RuS\ViCom_15.0\tools\TSME\TsmePing.exe`).
- Is the PC configured to use the subnet `192.168.0.0` with a different IP address to the R&S TSME (default: `192.168.0.2`)? (See also chapter 2.2.2.1, "Configuring the LAN Interface on the Host PC", on page 17.)
- Are **other applications** trying to access the R&S TSME at the same time (e.g. R&S ROMES, R&S ViCom, R&S TSME Device Manager)? Check the Windows TaskManager and look for associated processes. If necessary, stop the processes.
- Is the host using **other network connections** at the same time, such as VPN? R&S TSME does not work when the PC is connected to R&S VPN.
- Is the **connecting cable** between the host and the R&S TSME the one provided with the R&S TSME? Make sure you are using a quality CAT5e or better Gigabit Ethernet conform cable. RJ45 connectors must be shielded, not plastic.
- After switching the R&S TSME off and back on, is the **POWER LED** on the R&S TSME **blinking** while the **STATE LED** is **off**? This indicates that the TSME can not boot. Contact Rohde & Schwarz Support Center.

► Configure the firewall to allow the host PC to communicate with the R&S TSME:

a) Select the programs required for communication, and select **all three network types**.

   In particular, select:

   - TSME Device Manager Application
   - TsmePing

   If necessary, also select the following programs:

   - R&S ROMES
   - (For R&S ROMES 4.81 and higher additionally:) Dll Loader for PHYLIS Modules
   - R&S ViCom

6.3 Solving Other Miscellaneous Problems

In case measurement problems occur with the R&S TSME, check the "Device Analysis Output" table in the R&S TSME Device Manager for any errors that may have been dectected as a first measure (see chapter 4.1, "The R&S TSME Device Manager", on page 31).

Problem: R&S ROMES does not detect the R&S TSME 50
Problem: The R&S TSME Device Manager does not detect the R&S TSME 50
Problem: The options in the R&S TSME Device Manager are lost 50

Problem: error message: "No calibration data"....50
Problem: R&S TSME does not provide measurement data....50
Problem: The STATE LED is blinking red....50

Problem: R&S ROMES does not detect the R&S TSME
Possible solutions:

- Restart R&S ROMES, while the R&S TSME is connected and switched on.
- Restart the PC and then start R&S ROMES, while the R&S TSME is connected and switched on.

If you switch the instruments off and on again, be sure to switch on the R&S TSME before you start R&S ROMES!

Problem: The R&S TSME Device Manager does not detect the R&S TSME
Solution:

Be sure you have administrator rights on the host PC running the R&S TSME Device Manager.

Problem: The options in the R&S TSME Device Manager are lost
Solution:

Contact the Rohde & Schwarz Support Center.

Problem: error message: "No calibration data"
Solution:

Delete the `TSME_XXXXXX.cal` file in the application directory (e.g. `C:\Program Files (x86)\Rohde-Schwarz\ROMES4.78 or C:\RuS\ViCom_15.0\bin`) where `XXXXXX` is the serial number of the R&S TSME.

Problem: R&S TSME does not provide measurement data
Solution:

Delete the `TSME_XXXXXX.cal` file in the application directory (e.g. `C:\Program Files (x86)\Rohde-Schwarz\ROMES4.78` or `C:\RuS\ViCom_15.0\bin`) where `XXXXXX` is the serial number of the R&S TSME.

Problem: The STATE LED is blinking red
The instrument has become overheated. Check the airflow around the R&S TSME. If several instruments are stacked, set them side by side so each instrument can draw cool air from the bottom. If necessary, install an active cooling device. See the preconditions for setup described in "Risk of instrument damage due to overheating" on page 15.

A Appendix: Available Cellular Bands

The following cellular bands are available for selection for R&S TSMEs with a limited band option (see chapter 1.3.2, "Band Options", on page 11).

Table 1-1: Available cellular bands for the R&S TSME

ID	TSME Band	Span	Start [MHz]	Stop [MHz]
1	"TETRA"	span 1	375	435
		span 2	445	475
		span 3	865	881
		span 4	910	926
2	"CDMA 400"	span 1	410	493
3	"480"	span 1	478	486
		span 2	488	496
4	"700"	span 1	698	862
5	"810"	span 1	806	821
		span 2	851	866
6	"850"	span 1	806	940
7	"900"	span 1	917	960
		span 2	872	915
8	"1400"	span 1	1427	1448
		span 2	1475	1496
9	"PDC Japan"	span 1	1447	1463
		span 2	1495	1511
10	"1500/1600"	span 1	1626	1661
		span 2	1525	1559
11	"AWS"	span 1	1710	1770
		span 2	2110	2170
12	"1700"	span 1	1749	1785
		span 2	1840	1880
13	"1800"	span 1	1710	1785
		span 2	1805	1880
14	"1900"	span 1	1850	1915
		span 2	1930	1995
15	"2100"	span 1	1920	1980
		span 2	2110	2170

ID	TSME Band	Span	Start [MHz]	Stop [MHz]
16	"S-Band"	span 1	2000	2020
		span 2	2180	2200
17	"2600"	span 1	2496	2690
18	"3500"	span 1	3410	3490
		span 2	3510	3590
19	"WiMAX 7.x"	span 1	730	770
		span 2	890	903
		span 3	915	950
20	"WiMAX 8.A/TDD 1900/2000"	span 1	1785	1805
		span 2	1880	1930
		span 3	2010	2025
21	"TDD 1800"	span 1	1800	1830
22	"TDD 1930"	span 1	1930	1990
23	"TDD 2300"	span 1	2300	2400
24	"TDD 3300"	span 1	3300	3400
25	"TDD 3400"	span 1	3400	3600
26	"TDD 3600"	span 1	3600	3800

Table 1-2: Additional information on cellular bands

ID	Band Name	Included standardized bands	UL low	UL high	DL low	DL high	Duplex
1	**"TETRA"**	T-GSM 380	380.2	389.8	390.2	399.8	FDD
		T-GSM 410	410.2	419.8	420.2	429.8	FDD
		GSM 450	450.4	457.6	460.4	467.6	FDD
		TETRA 380 to 400	380	390	390	400	FDD
		TETRA 410 to 430	410	420	420	430	FDD
		TETRA 450 to 470	450	460	460	470	FDD
		TETRA 900	870	876	915	921	FDD
		LTE Band 31	452.5	457.5	462.5	467.5	FDD
2	**"CDMA 400"**	CDMA2000/EV-DO Band Class 11 (400 MHz European PAMR Band)	410	483	420	493	FDD
		CDMA2000/EV-DO Band Class 5 (450 MHz Band)	410	483	420	493	FDD
3	**"480"**	GSM 480	478.8	486	488.8	496	FDD
4	**"700"**	WiMAX 7.A	698	862	698	862	TDD

ID	Band Name	Included standardized bands	UL low	UL high	DL low	DL high	Duplex
		CDMA2000/EV-DO Band Class 19 (Lower 700 MHz Band)	698	716	728	746	FDD
		LTE Band 12 (lower 700 A/B/C)	699	716	729	746	FDD
		3GPP WCDMA XII	699	716	729	746	FDD
		LTE Band 17 (lower 700 B)	704	716	734	746	FDD
		GSM 710	698	716	728	746	FDD
		LTE Band 44 TDD	703	803	703	803	TDD
		CDMA2000/EV-DO Band Class 7 (Upper 700 MHz Band)	776	788	746	758	FDD
		Band 13 (upper 700 C)	777	787	746	756	FDD
		WiMAX 7.B	776	787	746	757	FDD
		3GPP WCDMA XIII	777	787	746	756	FDD
		CDMA2000/EV-DO Band Class 18 (700 MHz Public Safety Band)	787	799	757	769	FDD
		LTE Band 14 (upper 700 D)	788	798	758	768	FDD
		3GPP WCDMA XIV	788	798	758	768	FDD
		WiMAX 7.C	788	798	758	768	FDD
		WiMAX 7.D	788	798	758	768	FDD
		GSM 750	777	793	747	763	FDD
		LTE Band 28 (700 APT)	703	748	758	803	FDD
		LTE Band 20	832	862	791	821	FDD
		3GPP WCDMA XX	832	862	791	821	FDD
5	**"810"**	T-GSM 810	806	821	851	866	FDD
6	**"850"**	GSM 850	824	849	869	894	FDD
		3GPP WCDMA V	824	849	869	894	FDD
		LTE Band 5	824	849	869	894	FDD
		LTE Band 26	814	849	859	894	FDD
		LTE Band 18	815	830	860	875	FDD
		CDMA2000/EV-DO Band Class 0 (800 MHz Band)	815	849	860	894	FDD
		CDMA2000/EV-DO Band Class 10 (Secondary 800 MHz Band)	806	901	851	940	FDD
		CDMA2000/EV-DO Band Class 12 (800 MHz PAMR Band)	870	876	915	921	FDD
		3GPP WCDMA VI	830	840	875	885	FDD
		3GPP WCDMA XIX	830	845	875	890	FDD

ID	Band Name	Included standardized bands	UL low	UL high	DL low	DL high	Duplex
		3GPP WCDMA XXVI	814	849	859	894	FDD
		LTE Band 27	807	824	852	869	FDD
		LTE Band 6	830	840	875	885	FDD
		LTE Band 19	830	845	875	890	FDD
		TETRA 900	870	876	915	921	FDD
		CDMA2000/EV-DO Band Class 3 (JTACS Band)	887	925	832	870	FDD
7	**"900"**	P-GSM 900	890	915	935	960	FDD
		E-GSM 900 (includes P-GSM 900)	880	915	925	960	FDD
		R-GSM 900 (includes E-GSM 900)	876	915	921	960	FDD
		3GPP WCDMA VIII	880	915	925	960	FDD
		LTE Band 8	880	915	925	960	FDD
		WiMAX 7.G	880	915	925	960	FDD
		CDMA2000/EV-DO Band Class 9 (900 MHz Band)	880	915	925	960	FDD
		CDMA2000/EV-DO Band Class 2 (TACS Band)	872	915	917	960	FDD
8	**"1400"**	3GPP WCDMA XI	1427.9	1447.9	1475.9	1495.9	FDD
		LTE Band 11	1427.9	1447.9	1475.9	1495.9	FDD
9	**"PDC Japan"**	3GPP WCDMA XXI	1447.9	1462.9	1495.9	1510.9	FDD
		LTE Band 21	1447.9	1462.9	1495.9	1510.9	FDD
10	**"1500/1600"**	CDMA2000/EV-DO Band Class 20 (L-Band)	1626	1660	1525	1559	FDD
		LTE Band 24	1626.5	1660.5	1525	1559	FDD
11	**"AWS"**	3GPP WCDMA IV	1710	1755	2110	2155	FDD
		3GPP WCDMA X	1710	1770	2110	2170	FDD
		LTE Band 4	1710	1755	2110	2155	FDD
		LTE Band 10	1710	1770	2110	2170	FDD
		CDMA2000/EV-DO Band Class 15 (AWS Band)	1710	1755	2110	2155	FDD
		WiMAX 6.A	1710	1770	2110	2170	FDD
12	**"1700"**	3GPP WCDMA IX	1749.9	1784.9	1844.9	1879.9	FDD
		LTE Band 9 (UMTS1700)	1749.9	1784.9	1844.9	1879.9	FDD
		CDMA2000/EV-DO Band Class 4 (Korean PCS Band)	1750	1780	1840	1870	FDD
13	**"1800"**	DCS 1800	1710	1785	1805	1880	FDD

ID	Band Name	Included standardized bands	UL low	UL high	DL low	DL high	Duplex
		3GPP WCDMA III	1710	1785	1805	1880	FDD
		LTE Band 3	1710	1785	1805	1880	FDD
		CDMA2000/EV-DO Band Class 8 (1800 MHz Band)	1710	1785	1805	1880	FDD
		WiMAX 6.C	1710	1785	1805	1880	FDD
14	**"1900"**	PCS 1900	1850	1910	1930	1990	FDD
		3GPP WCDMA II	1850	1910	1930	1990	FDD
		3GPP WCDMA XXV	1850	1915	1930	1995	FDD
		3GPP TDD incl. TD-SCDMA b	1850	1910	1930	1990	TDD
		LTE Band 2	1850	1910	1930	1990	FDD
		LTE Band 35 TDD	1850	1910			TDD
		CDMA2000/EV-DO Band Class 1 (1900 MHz Band)	1850	1910	1930	1990	FDD
		CDMA2000/EV-DO Band Class 14 (US PCS 1.9GHz Band)	1850	1915	1930	1995	FDD
		LTE Band 25 (PCS A-G superset of band 2)	1850	1915	1930	1995	FDD
15	**"2100"**	3GPP WCDMA I	1920	1980	2110	2170	FDD
		LTE Band 1	1920	1980	2110	2170	FDD
		CDMA2000/EV-DO Band Class 6 (2 GHz IMT2000 Band)	1920	1980	2110	2170	FDD
		WiMAX 6.B	1920	1980	2110	2170	FDD
16	**"S-Band"**	LTE Band 23	2000	2020	2180	2200	FDD
		CDMA2000/EV-DO Band Class 21 (S-Band)	2000	2020	2180	2200	FDD
17	**"2600"**	LTE Band 7	2500	2570	2620	2690	FDD
		CDMA2000/EV-DO Band Class 13 (25 GHz IMT-2000 Extension Band)	2500	2570	2620	2690	FDD
		3GPP WCDMA VII	2500	2570	2620	2690	FDD
		CDMA2000/EV-DO Band Class 16 (US 2.5 GHz Band)	2502	2568	2624	2690	FDD
		CDMA2000/EV-DO Band Class 17 (US 2.5 GHz Forward Link Only Band)			2624	2690	FDD (DL only)
		LTE Band 41 TDD	2496	2690	2496	2690	TDD
		WiMAX 3.A	2496	2690	2496	2690	TDD
		WiMAX 3.B	2496	2572	2614	2690	FDD
		LTE Band 38 TDD	2570	2620	2570	2620	TDD

ID	Band Name	Included standardized bands	UL low	UL high	DL low	DL high	Duplex
		3GPP TDD incl. TD-SCDMA d	2570	2620	2570	2620	TDD
18	**"3500"**	3GPP WCDMA XXII	3410	3490	3510	3590	FDD
		LTE Band 22	3410	3490	3510	3590	FDD
19	**"WiMAX 7.x"**	7.x* lower	730	770	730	770	TDD
		7.x* mid	890	903	890	903	TDD
		7.x* higher	915	950	915	950	TDD
20	**"WiMAX 8.A/TDD 1900/2000"**	WiMAX 8.A lower	1785	1805	1785	1805	TDD
		WiMAX 8.A mid	1880	1930	1880	1930	TDD
		WiMAX 8.A upper	2010	2025	2010	2025	TDD
		3GPP TDD incl. TD-SCDMA a (lower)	1900	1920	1900	1920	TDD
		LTE Band 33 TDD	1900	1920	1900	1920	TDD
		3GPP TDD incl. TD-SCDMA c	1910	1930	1910	1930	TDD
		LTE Band 37 TDD	1910	1930	1910	1930	TDD
		3GPP TDD incl. TD-SCDMA f	1880	1920	1880	1920	TDD
		LTE Band 39 TDD	1880	1920	1880	1920	TDD
		3GPP TDD incl. TD-SCDMA a (upper)	2010	2025	2010	2025	TDD
		LTE Band 34 TDD	2010	2025	2010	2025	TDD
21	**"TDD 1800"**	WiMAX 8.G	1800	1830	1800	1830	TDD
22	**"TDD 1930"**	LTE Band 36 TDD	1930	1990	1930	1990	TDD
23	**"TDD 2300"**	LTE Band 40 TDD	2300	2400	2300	2400	TDD
		3GPP TDD incl. TD-SCDMA e	2300	2400	2300	2400	TDD
		WiMAX 1.A	2300	2400	2300	2400	TDD
		WiMAX 1.B	2300	2400	2300	2400	TDD
		WiMAX 2.D (lower)	2305	2320	2305	2320	TDD
		WiMAX 2.D (upper)	2345	2360	2345	2360	TDD
		WiMAX 2.E	2345	2360	2305	2320	FDD
		WiMAX 2.F	2345	2360	2305	2320	FDD
24	**"TDD 3300"**	WiMAX 4.A	3300	3400	3300	3400	TDD
		WiMAX 4.B	3300	3400	3300	3400	TDD
		WiMAX 4.C	3300	3400	3300	3400	TDD
25	**"TDD 3400"**	LTE Band 42 TDD	3400	3600	3400	3600	TDD
		WiMAX 5L.A	3400	3600	3400	3600	TDD

ID	Band Name	Included standardized bands	UL low	UL high	DL low	DL high	Duplex
		WiMAX 5L.B	3400	3600	3400	3600	TDD
		WiMAX 5L.C	3400	3600	3400	3600	TDD
		WiMAX 5L.D	3400	3500	3500	3600	FDD
26	**"TDD 3600"**	LTE Band 43 TDD	3600	3800	3600	3800	TDD
		WiMAX 5H.A	3600	3800	3600	3800	TDD
		WiMAX 5H.B	3600	3800	3600	3800	TDD
		WiMAX 5H.C	3600	3800	3600	3800	TDD

Index

Symbols

1xEV-DO
Option ... 9

A

AUX
Connector ... 29

B

Backpack system ... 15
Band options ... 11
Available ... 11

C

CDMA2000®
Option ... 9
Connected mode ... 45
Connectors
AUX ... 29
DC IN ... 29
GPS antenna ... 30
LAN ... 29
Overview ... 27
Rear panel ... 27
RF IN ... 30

D

DC IN
Connector ... 29
Device data
Updating ... 33, 35, 40
Device list
Selecting devices ... 33
Updating ... 33
Device Manager
Finding software license keys ... 37
Installing software license keys ... 37
Selecting devices ... 33
Software license keys ... 37
Updating device data ... 33, 35, 40
Updating device list ... 33

E

Electrostatic discharge ... 13
Equipment
Required ... 7
Error mode ... 45
ESD ... 13

F

Firmware updates ... 43

G

GPS
Antenna connector ... 30
GSM
Option ... 9

H

Host PC ... 6

I

Identifying
Configuration ... 34
Idle mode ... 44
Instrument modes ... 44

K

Kensington Lock
Connecting ... 24

L

LAN
Configuration ... 17
Connector ... 29
LAN connection
Troubleshooting ... 46
LEDs
Power ... 28
State ... 28
Locks
Connecting ... 24
LTE
Option ... 10

M

Measuring mode ... 45

O

On/Off key ... 29
Options
Band ... 11

P

Power
LED ... 28
Power supply
Removing ... 25

R

Rackmounting ... 15
RF IN
Connector ... 30
RF Power
Option ... 10

S

Self-alignment ... 43
Software license keys ... 37
Finding ... 37
Information ... 36

Installing 35
Managing 35
Prerequisites 35
Updating 37
Standby mode 25, 45
State
LED 28
Switching on/off 24

T

TD-SCDMA
Option 9
Technology options 8
1xEV-DO (K24) 9
Available 8
CDMA2000 (K22) 9
GSM (K23) 9
LTE (K29) 10
RF Power (K27) 10
TD-SCDMA 9
TETRA (K26) 9
WCDMA (K21) 9
WiMAX (K28) 10
TETRA
Option 9
Troubleshooting
LAN connection 46

U

Updates
Firmware 43

W

WCDMA
Option 9
WiMAX
Option 10